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ABSTRACT

Urban environmental management and environmental health issues are of increasing concern worldwide. The need for urban environmental management work at the local level where the Peace Corps works most effectively is significant, but training materials dedicated specifically to community-based solid waste management work in urban areas are lacking. This manual presents a facilitator's approach to community-based solid waste management (CBSWM). Objectives include providing training sessions for development workers beginning and continuing solid waste management projects; providing information about solid waste management for people interested in the issues; compiling designs of solid waste transport vehicles, storage containers, and landfill models in one place to serve as a reference source; and compiling the experiences of solid waste collection systems worldwide so that others may learn from past successes and failures. This guide is divided into seven sections: 1) Introduction; 2) Guide To Selecting the Best Sections for Your Needs; 3) How To Conduct a Site Visit for CBSWM Activities; 4) Planning a CBSWM Workshop; 5) Raising Our Own Awareness and Building a Community Base (sessions 1-11 of the workshop); 6) Implementing CBSWM (sessions 12-28 of the workshop); and 7) Lesson Plans for Educators (adaptable to a variety of classroom situations for students of all levels). Also includes a bibliography and lists of additional resources. (PVD)

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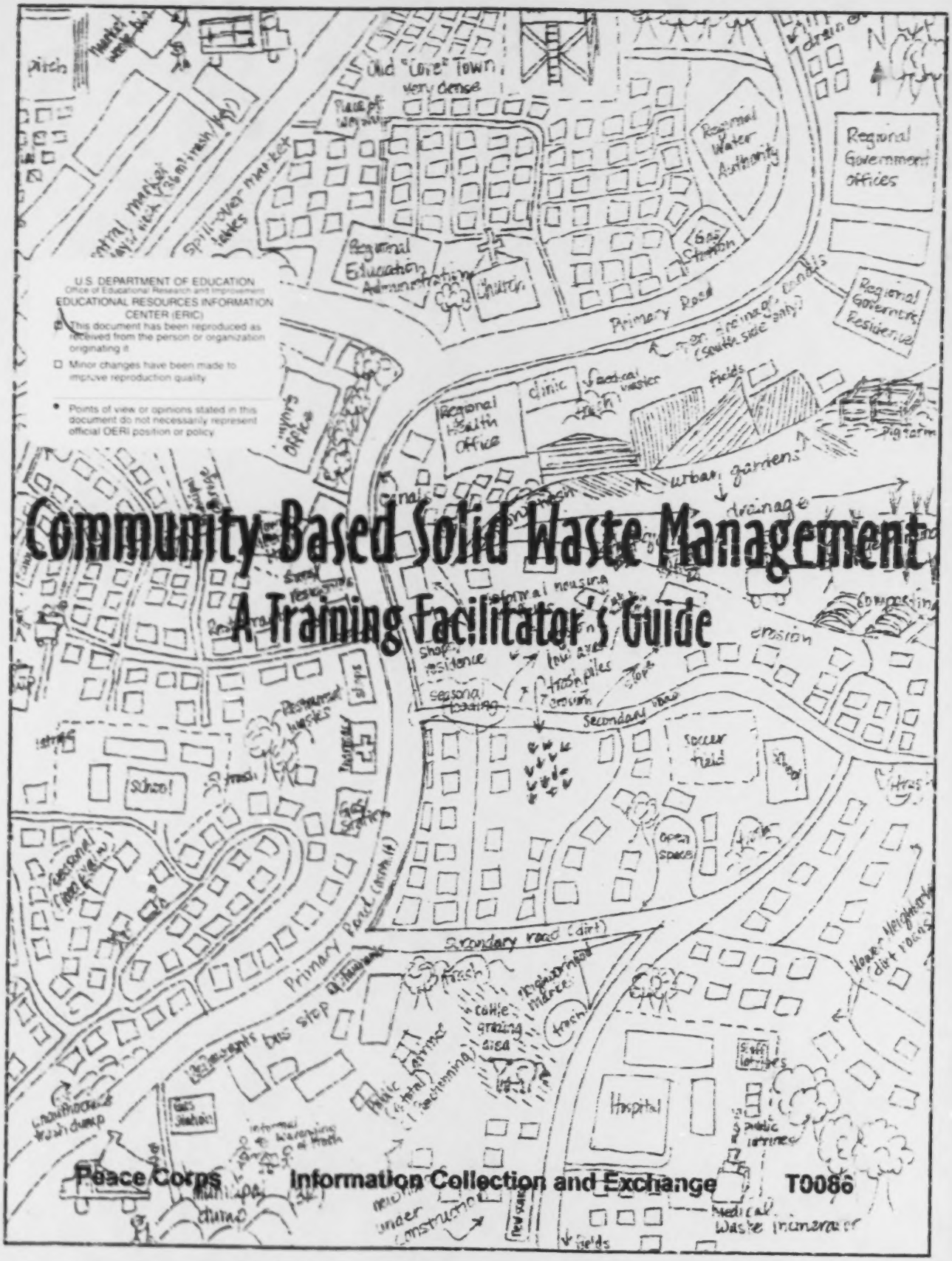

Community-Based Solid Waste Management

A Training Facilitator's Guide

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Community-Based Solid Waste Management
A Training Facilitator's Guide

Peace Corps Information Collection and Exchange T0086

August 1997

Contents

vii Acknowledgments

viii Glossary

1 **Section One** Introduction

3 Objectives
3 A Community-Based Approach

5 **Section Two** Guide to Selecting the Best Sections for Your Needs

5 Interdisciplinary Guidance to Using This Manual
6 Interested Citizens
6 Small Business Development Workers
6 Youth Development/At-Risk Youth Workers
8 Women in Development/Gender and Development Workers
8 Agriculture Workers
9 Water and Sanitation Development Workers
9 Health Education Workers
10 Environment and Natural Resources Development Workers
11 Teachers
12 Project and Program Managers Working in Urban Sanitation
12 Peace Corps Volunteers and Staff

15 **Section Three** How to Conduct a Site Visit for CBSWM Activities

18 **Section Four** Planning a Community-Based Solid Waste Management Workshop

18 Assessing the Situation
19 Participants
20 Workshop Staff
20 Notes on Training
21 Training Materials
21 Training Site Selection

23 **Section Five** Raising Our Own Awareness and Building a Community Base
24 Session 1: A Shocking World View of Trash
28 Session 2: Assessing the Site and the Situation
30 Session 3: Trash Tells a Story...Characterizing the Solid Waste Stream
33 Session 4: Asking Questions
39 Session 5: Facilitating a Group Discussion
47 Session 6: PACA...Introduction to PACA Methodology
63 Session 7: PACA...Preparation for a Field Visit
69 Session 8: PACA Tools...A Representative Daily Activity Schedule
72 Session 9: PACA Tools...Community Resource Mapping
76 Session 10: Needs Assessment and Community Assets
90 Session 11: PACA Tools...Debriefing Field Work
97 Summary of Section Five

98 **Section Six** Implementing CBSWM
99 Session 12: Role of Legislation, Regulation, and Enforcement in SWM
101 Session 13: Working with the Municipal Government
103 Session 14: Understanding the Importance of Civil Society
105 Session 15: Further Exploration of the Sociology of Trash
107 Session 16: Assessing Current vs. Desired Service
109 Session 17: A Day with the Trash Truck
111 Summary of Sessions 12-17
112 Session 18: Collection, Transportation, and Storage: Understanding Options for Community-Based SWM
117 Session 19: Working with Community Members to Develop an Action Plan
122 Session 20: Environmental Education and Information Dissemination
125 Session 21: Trash Collection as an Income-Generating Activity
125 Part 1: Introduction to Solid Waste
132 Part 2: Entrepreneurship Test and Answers
135 Part 3: The Fundamentals of Entrepreneurship
137 Part 4: Improving an Organization
139 Part 5: Identifying a Group To Provide SWM Services
143 Part 6: Conducting a Feasibility Study
149 Part 7: Putting Together a Service Business
151 Part 8: Marketing a Solid Waste Management Service
152 Part 9: Application of Marketing Techniques
153 Part 10: Accounting, Bookkeeping, and Financial Reporting for Solid Waste Collectors
159 Part 11: Equipment and Materials Needed
162 Part 12: Establishing a Budget and Fixing an Appropriate Fee

165 Session 22: Additional Activities for Solid Waste Management
165 Part 1. Analysis of Potential of the Waste Stream
166 Part 2. Artisanal and Industrial Recycling
168 Part 3. Composting of Solid Waste and Urban Agriculture
172 Part 4. Biogas Digestors
177 Part 5. Recycling Tires
178 Session 23: Special Wastes
178 Part 1. Medical Waste
185 Part 2. Hazardous Wastes
186 Part 3. Used Motor Oil
188 Session 24: Final Siting of Intermediary Depots and the NIMBY Phenomenon
190 Session 25: Open Dumps vs. Sanitary Landfills
206 Session 26: Scavengers
209 Session 27: Solid Waste Management in Fragile Lands
211 Session 28: Trouble Shooting for Community-Based Solid Waste Management

213 **Section Seven** Lesson Plans for Educators

214 Litter: More Than a Passing Glance
215 Waste Disposal
216 Land Pollution
217 Recycling
218 Key Mangrove: Part One...A System in Conflict
225 Key Mangrove: Part Two...A Conflict of Interests
232 Infusion Activity for Environmental Health
236 Field Trips
240 Four Urban Activities
245 Science/Technology/Society
250 Coming to Terms with Marine Debris
253 Trash Traits
258 A Degrading Experience
262 Environmental Pollution: Littering

267 **Bibliography**

269 Additional Resources
271 Email, Snailmail, and Web Site Sources

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The Water and Sanitation sector also acknowledges the many Volunteers, Peace Corps staff members, and host country colleagues, who expressed interest in knowing more about urban environmental management, environmental health and solid waste management issues. Many development workers struggle with these challenging issues of poor health, lack of services, and great potential for community-based activities everyday. This manual addresses reversing negative environmental health conditions in primary urban areas, secondary towns and periurban areas, and wherever poor environmental health conditions exist.

This manual contains illustrations from many sources, and many of the lesson plans are adapted from previously published works. In each case, permission was sought and obtained, and while each usage is individually acknowledged, I extend a big, collective thank you to these educators.

Finally, I am grateful to Peace Corps staff members Joy Barrett, Jim Russell, Judy Benjamin, and John Shores for taking time to read drafts of this manual and provide feedback. A very special thank you goes to Isabelle Bully-Omictin, Returned Peace Corps Volunteer (RPCV)/Philippines and Paula Estornell, RPCV/Malta for reading the draft and providing their comments, which greatly enhance the scope of this document.

This manual was written by Julie Burland, former Associate Peace Corps Director, Urban Environmental Management, Côte d'Ivoire, and funded by the U.S. Environmental Protection Agency, Office of International Activities Publication, under contract PC197-1004. It was designed by Susan H. Malcik, RPCV/The Gambia, under contract PC897-4037.

Glossary

APCD	Associate Peace Corps Director
CBSWM	Community-Based Solid Waste Management
EPA	Environmental Protection Agency
IST	In-Service Training
MDSP	Municipal Development Support Program
MMTP	Municipal Management Training Program
MSW	Municipal Solid Waste
NGO	Non-Governmental Organization
OTAPS	Office of Training and Program Support
PACA	Participatory Appraisal for Community Action
PCV	Peace Corps Volunteer
PST	Pre-Service Training
RPCV	Returned Peace Corps Volunteer
RRA	Rapid Rural Appraisal
SW	Solid Waste
SWM	Solid Waste Management
SWMC	Solid Waste Management Committee
USAID	United States Agency for International Development
WID/GAD	Women in Development/Gender and Development

Introduction Section One

On a global scale urban environmental management and environmental health issues increase alarmingly and at compelling rates. The solution to urban environmental management issues requires enhancing and strengthening bonds among health and environment workers, citizens, and government policy makers and implementers. When they are all able to discuss jointly how to improve the health of citizens, how to protect and clean up the environment, and what is the most effective means by which this can happen, then environmental health conditions will improve.

The Peace Corps' forte, however, is not on the global scale. Rather, the Peace Corps works most effectively at the local level. Volunteers in Senegal, Mauritania, Ghana, Benin, Mali, the Philippines, and Chile have requested documents on urban environmental management topics. The need and the opportunity for urban environmental management work at the Peace Corps Volunteer (PCV) level is significant.

For all the expressed need, training materials specifically dedicated to community-based solid waste management work in urban and periurban areas are lacking. Solid waste should not be confused with liquid wastes, a more familiar sanitation topic. Solid waste refers to waste generated in households, commercial establishments, institutions, and light industries. Heavy industry wastes, agricultural wastes, mining wastes, and sewage sludge are not part of solid wastes discussed in this manual. The terms solid waste, trash, community solid waste, and municipal solid waste are used interchangeably in this document.

Liquid wastes, by contrast, include all wastes from human and animal excrement and used water from households including kitchen and shower water, also called gray water. Training materials for treating liquid wastes can be found under the categories of sanitation, sewage, latrines, and waste water.

With the EPA's generous assistance, Julie Burland, former Associate Peace Corps Director, Urban Environmental Management Project/Côte d'Ivoire, was commissioned to write a manual addressing solid waste management issues. This manual presents a facilitator's approach to community-based solid waste management (CBSWM).

Assumptions are that:

- The facilitator is knowledgeable and experienced in this subject.

- The participants in the training course are not necessarily specialists in solid waste management for developing countries.

- The participants may use the information and skills they gained to train a next generation of participants, but the sessions might need to be modified to suit those conditions.

- This material is not intended to be presented all at once, although sections of the manual may be grouped to form week-or month-long training sessions.

- The sessions cover a wide variety of topics, from community entry and assessment to designing a landfill. The modular nature of the manual lends itself to extracting the sessions that best meet the needs of the participants.

PCVs are in good company when it comes to development workers. Requests from governmental and non-governmental workers from countries such as the Seychelles and Mauritania for documentation and suggestions on how they might work with their communities on improving environmental health conditions have reached Peace Corps. We hope that this manual will serve development workers everywhere who are interested in community-based urban environmental management.

Documentation providing information, training guidelines, and *how-to's* for water and sanitation activities is readily available. The missing element—trash collection and disposal—is what this manual is for. However, the linkages between trash collection, clean water, and appropriate sanitation are strong. Development workers who wish to intervene in solid waste management will likely find themselves involved in a multiplicity of environmental health issues.

The relationship between the urban or built environment and the natural environment has demonstrated a degree of connectedness that activity programmers are only beginning to address. Environmental programs that address conservation of biodiversity, protection of water ways, and the planting of trees are equally important components of an environmental protection scheme. Imagine what happens when a forest, with its flora and fauna, are protected and conserved but the city, five kilometers down the way has so much solid waste that city officials are looking at the open space of the forest as a landfill site. Or when a section of coast is protected to preserve the coral reef, but the population nearby lacks sanitation infrastructure. The protection of the area may keep boats and fisherfolk out, but human excreta and other wastes may cause just as much harm to that protected coastal area. These two examples illustrate the necessity of holistic environmental activities.

Finally, the idea of solid waste as a nuisance to be disposed of, buried, or incinerated must change! Solid waste is a resource that can produce energy, employment, and simple and complex products through re-use and recycling. When solid waste can be viewed as a resource, market forces will create a

favorable environment for once-used products. Until then, this training manual will help fill in the knowledge gaps.

Objectives

As development workers worldwide increasingly recognize the crucial and absolute importance of the role of community members in development, and in order to work ourselves out of a job, we are writing this manual with more than PCVs in mind. This manual is for literate people who have questions about trash.

The objectives of this manual are to:

- Provide training sessions for development workers beginning and continuing solid waste management projects and activities.
- Provide information about solid waste management for people interested in the issues.
- Compile designs of solid waste transport vehicles, storage containers, and landfill models in one place to serve as a reference source.
- Compile experiences of worldwide solid waste collection systems so that others may learn from past successes and failures.

NB: Materials in this manual will need to be adapted to address the needs of the visually challenged.

A Community-Based Approach

Development workers, at their best, facilitate activities which lead community members to take action to improve their own lives. At their least effective, development workers do the work they sense needs to be done. After three decades of the latter approach, with many good intentions but few lasting results, reports from the field demonstrate that when community members work together to decide which interventions meet their own needs best, then the results are sustainable from a financial and human resource perspective.

Development workers using a community-based approach note that results do not come quickly. Sometimes communities are still waiting (in vain) for the government to come in and do something about their problems. This type of community needs more time and is not ready to come together to address common problems. Increasingly however, community members recognize that the national government is unable to provide the solutions to all their problems and are willing to take time to mobilize to solve a problem.

In spite of the recognition that a community should work together, some community members have not had the tradition or experience of working closely with others.

Individuals and groups need additional skills in assessment or community development as well as skills in talking amongst themselves, establishing trust, and assessing the group dynamic prior to taking action. This takes time, patience and skill, and the effective development worker will draw as much satisfaction from the community-building as from the eventual improved environmental health conditions.

This manual frequently uses the word *community* to describe a group of people with whom a development worker will interact. Community members, from a foreign development worker's perspective, are host country people living in a neighborhood where a development worker will interact, form partnerships, suggest alternative practices, and share information and life experiences. The goal of this manual is to train development workers to effectively work in host country communities.

For training purposes, the use of the word *community* or *community member* needs further clarification. To avoid pitfalls associated with sending Trainees into a community to practice new skills (i.e., inferior language skills, lack of experience working cross-culturally, raising the expectations of community members to benefit from an activity or service, using host country people as guinea pigs, etc.), this training manual defines community as the group of participants at the training center, the support staff (cooks, housekeepers, gardeners) at the training center, the language staff of the training center (if applicable) or another group of people who will not be inconvenienced by trainees' inexperience.

The lead trainer will need to determine the most appropriate *community* for trainee interaction at a given time during the training. If a trainer decides to limit trainee interaction to the community of the training center, then in the session plans, think *training center community* when you see the word community. This manual will not tell you not to seek out host country communities, only that the choice to conduct activities in such a community is a complex one and that it should be well thought out with respect to the costs and benefits to the trainees and to the host country community members.

Guide to Selecting the Best Sections for Your Needs Section Two

Training development workers to work effectively in solid waste management (SWM) takes a combination of knowledge and skills. Whether your primary task is improving the urban environment or teaching science, this manual is designed to provide information on solid waste management and meet your needs. This manual has information for teachers, extension workers, Peace Corps Volunteers, project managers, and interested citizens.

The material in this manual is not intended to be taught in a single mega-training program or learned in a single reading. Some of the skills ought to be introduced, practiced and then, some time later, processed or refined. Suggested groupings of training sessions according to timing will follow in this section. People with as few as five hours will find information and training sessions which provide answers to why CBSWM is necessary and how to do something about it.

The discipline of solid waste management cuts across many sectors. Progress and results in improving a solid waste management system rely as much on *getting the system right* as it does on supportive activities, information flows, and attention to linkages within the larger context of our global community.

Community-based activities depend largely on the strength, talents, and motivation of the community members. Too often development efforts focus on the needs of a community, which puts people in a deficit frame of mind. In order to encourage positive community images, I have suggested using a community assets approach along side of the needs approach. Whereas needs identification is important to direct efforts, a balance must be struck between needs and existing strengths in skills, organization, and resources in order to build up a community's belief in itself.

People working in different disciplines have expressed interest in solid waste management, but have also expressed confusion as what to do about the challenges. In this section, I have provided guidance and suggestions as to how I, as the author, envision different people using this manual.

Interdisciplinary Guidance to Using This Manual

Individuals with diverse backgrounds and skills, from concerned citizens interested in learning more about solid waste management to program managers of urban environmental activities, can all benefit from various sessions this manual. Link-

ages between other sectors and the discipline of solid waste management are also discussed.

I encourage you to adapt my advice to meet your needs and contribute to the solution of the solid waste management challenge.

Interested Citizens

If you are interested in solid waste management and would like an overview of the challenges, read *Session 21*, including the article, A Shocking World View of Trash. To gain a bit of practical experience working with solid waste, read *Session 3* and conduct a solid waste stream analysis as outlined in the session plan.

For more information on possible solutions to the solid waste challenge, read the section called *Implementing CBSWM.*

After reading through these sections, you may decide to get more involved with solid waste management. If that is the case, I recommend reading through *Section Five: Raising Our Own Awareness and Building a Community Base.*

Small Business Development Workers

A natural linkage between small business development and solid waste management happens when viewing solid waste as a resource. The potential to generate income from organizing a solid waste business, or from selling recycled products is great.

The knowledge and skills of a small business development worker are particularly valuable because, admittedly, the income generated from solid waste management or recycling is generally low. Solid waste management documents usually contain cost/benefit ratio scales to demonstrate the fine line between a defunct and viable business. Development workers with business skills can greatly enhance the entrepreneurial nature of community-based solid waste management with their eye for opportunities and also their skills in proper accounts management, budgeting, and marketing.

A small business development worker will find the most appropriate training sessions in *Section Six, Sessions 21, 22, 26, and 28.* Background information on the multiplicity of business opportunities available in solid waste can be found in Work From Waste: Recycling Wastes to Create Employment by Jon Vogler.

Youth Development/At-Risk Youth Workers

Unemployment and underemployment for youth is a huge problem in most developing countries. Contributing factors include high population levels of people under 25 years

old, lack of a private sector to increase the number of jobs available, and a significant rate of school leavers among youth.

Youth want and need jobs. Their lack of education may prevent them from gaining or holding a job in the formal sector. Many youth, in spite of (or maybe because of) their impoverished condition are motivated and willing to work hard. Others, however, aspire to win the lottery.

Solid waste management workers must be of the former category. The work is not easy nor is it glamorous. The hours do not necessarily have to be long however. Men or women are equally suited to conduct the work. While collecting trash is a physical activity, push carts can be ergonomically designed so that a less-strong person is able to push them. In many societies women are involved in recycling and resale activities, scavenging, education and awareness-raising, and accounting activities. Women are also involved in sweeping and cleaning the market, courtyard, and streets.

In many communities in Côte d'Ivoire, young people (90% male) have formed small businesses to collect trash. Some of the more successful businesses survive because of a dynamic leader. Good leaders can weather the staff turnover, financial difficulties, and provide guidance and motivation to the trash collectors. Leaders of this caliber are respected in the community and can help to resolve difficulties with clients. Leaders may or may not actually perform the physical work alongside their workers.

In the absence of a business leader, a mentor of some sort can serve the same function. Mentors have the advantage of impartiality as long as they are respected by everyone in the group.

Solid waste management has a relatively low skill requirement. Most successful solid waste workers are dependable, courteous, honest, and hardworking. A leader or mentor who has access to documents or human resources for technical trouble-shooting is very useful.

Frequently, and unfortunately, a difficulty in working with youth in solid waste management comes from combating community members' perceptions that youth are lazy and not trustworthy. Municipal authorities, with whom solid waste management activities must be coordinated, express similar doubts. Youth development workers need to be aware of these perceptions in order to combat them by cultivating an atmosphere of professionalism and the expectation that the youth are up to the challenge of providing a valuable service. Fortunately a little bit of praise for a job well done goes a long way with youth who desire to be valued and productive in their societies.

Youth development workers interested in training youth to be effective solid waste management agents will find training *Sessions 15, 21-23, and 28* pertinent to their challenge.

Women in Development/Gender and Development Workers

As a community analysis will demonstrate, women view solid waste differently from men. In West Africa, women and children have the responsibility for keeping the family courtyard clean, taking out the trash, and depositing it somewhere. Women are both participants in and users of a solid waste management system.

Points of entry for women to earn income from solid waste management include organizing and providing a solid waste collection service, collecting and recycling items to sell, or transforming into a new product; and providing components of a service such as community education, accounting or mentoring.

Notes of caution for WID/GAD workers: sometimes solid waste system organization or reorganization fails to identify *hidden* users of solid waste. Sorting and recycling happens at the household level prior to the waste being curbed. As waste is generally the responsibility of women, it is they who benefit from pre-curb recycling. Solid waste that is dumped outside the household area may be sorted by scavengers, who may be women or men. An improved solid waste management system that changes the patterns of disposal needs to take into account the existing uses for municipal solid waste (MSW) and work with them so as not to cut people off from their income.

WID/GAD workers will especially benefit from the *Participatory Analysis for Community Action* (PACA) exercises in *Sessions 6-11*. Skill building for female entrepreneurs are addressed in *Sessions 21-28*.

Agriculture Workers

Linkages between solid waste and agriculture are addressed in *Session 22, Part 3: Composting of Solid Waste, and Urban Agriculture* and *Part 4: Biogas Digestors*.

Agricultural workers can support solid waste management activities in urban areas by seeking out compostable materials from the solid waste stream either to compost by themselves or to purchase from a compost business. Small farmers in West Africa, following the devaluation of the CFA franc, found that they could no longer afford to purchase chemical soil enhancers and therefore were much more interested in compost.

Development workers involved in animal husbandry can support recycling of solid waste by using solid waste as feed. *Session 22* addresses this issue but more

complete information is available in Organic Waste by Inge Lardinois and Arnold van de Klundert, eds., TOOL Amsterdam and WASTE Consultants, Gouda, 1993. Agricultural workers also involved in animal husbandry are likely to have components of a successful biogas activity at hand: manure, agricultural wastes, and solid waste.

Water and Sanitation Development Workers

Rural water and sanitation workers may find that conditions at their site are similar to those in an urban area, but less severe. With a shift to a non-biodegradable lifestyle, even rural areas experience solid waste problems. Plastics in the environment, metal containers, paper goods, and used tires seem to be found everywhere.

Water and sanitation workers may wish to incorporate certain sessions into their repertoire of tools. *Sessions 2, 3, 18, 22, 23, and 25* may be particularly useful.

Depending on the role of a water and sanitation worker, suggestions made in the next section for health education workers, may prove useful to their task.

Water and sanitation workers who focus on building a community's capacity to repair and maintain their water resources (pump, protected spring) through artisanal repair persons, may be intrigued by the idea of establishing a solid waste collection service as an additional aspect to a water-source repair business. If this is the case, please consult *Session 21*.

Health Education Workers

Most health education workers are involved with maternal/child health and curative or preventative care. Think of the opportunities they have for introducing the topic of solid waste management. Patients waiting to see a health care provider look at posters on the walls, read magazines, or read brochures. Why not include a poster, magazine, or brochure on environmental health topics and the links to solid waste management?

People also come to the clinic for health education sessions called *causeries* in French, *consulta* in Portuguese, and *charla* in Spanish. Most of these informal health talks concern diarrhea, vaccinations, or nutrition. A health talk on disease vectors living and breeding in household wastes should be added. The presence of solid waste in or around the household might be the cause of diarrhea or problems with nutrition, or might serve to validate an additional need for vaccinations.

Health care workers frequently conduct home visits. Access to someone's house or courtyard provides a valuable opportunity to follow up on the reason for the house-holder's visit to the clinic but also, the health care worker could assist the householder in learning about some of the environmental health impacts of practices in their courtyard. In the environmental health field the state of health of an individual is studied

with the quotidian conditions of their surroundings. By improving the day to day conditions, environmental health practitioners seek to improve the overall quality of health of the individuals.

Health care workers can influence and educate their clients as to the negative impacts on health of an unsanitary environment. They can also serve as role models by adopting positive environmental health behaviors at the clinic or hospital. *Sessions 15, 21/Part 8, 23/Part 1, 24, 25,* and *26* may be of special interest to health care workers.

Environment and Natural Resource Development Workers

As discussed in the introduction, sole attention to the natural environment is a short-term solution to our global environmental challenges. Linking activities in the natural and built environment is an up-and-coming field replete with work. Environment and natural resources development workers can support built environment activities in many ways.

In national parks, anti-litter campaigns can be enhanced with posters or talks about why it is bad to litter. Beyond the negative aesthetic, litter harms animals, causes pollution, and carries diseases. The message might be enlarged to increase awareness that one piece of litter multiplied by all the visitors to the park multiplied by the population in the nearby town equals all the solid waste going to the town landfill. Landfills take up space. In a negative scenario, so much solid waste is generated that land is consumed at a rate which encroaches on the park's land. This scenario is not too far from the truth in some countries.

Other environmental education themes connected to solid waste management include dumping solid waste in waterways and the resultant pollution which kills fish and plant life. In coastal areas dumping of solid waste into the sea kills coral reefs and sea life and pollutes the water. Efforts to define solutions to these problems are enhanced by collaboration between conservationists and solid waste planners.

Behaviors and practices in the parks can enhance a solid waste management system by having and using solid waste receptacles at the headquarters, in guest rooms, in the restaurant, and along the trails (if appropriate), and by sorting bio-degradable items from recyclable items and composting.

National parks attract tourists who are eager to buy souvenirs. Small mementos of the park when made from recycled items are particularly attractive to today's eco-tourist. When souvenirs are made locally and/or combine traditional artisanal methods, symbols or colors, their value can be greatly enhanced. *Session 22/Part 2* has details about artisanal recycling.

Natural resources development workers focusing on environmental education in schools or informal education can greatly support improved solid waste management

awareness campaigns by including solid waste issues in their message. For hints on how to convey these messages refer to the following section, *Teachers*.

Teachers

Teacher of all subjects have the greatest opportunity of all development workers to change attitudes and behaviors surrounding solid waste management. Teachers have a ready audience during school hours. Many schools also have after-hours activities which could include a nature or environment club. If a community has already begun a solid waste management program, teachers and their students can support that activity by further exploring solid waste. And who knows, maybe students will take such a great interest in the lessons in solid waste management that they will talk to their parents or guardians who will talk to other community members who will decide to do something about the solid waste problem in their town.

Teachers in the course of defining environmental education and how it should influence a curriculum have focused on either integrating environmental education into existing curricula in all subjects or using environmental education techniques on one or two subjects like science or geography.

Much has been written about environmental education and many lesson plans have been developed. Those lesson plans most pertinent to solid waste management may be found in *Sessions 2-3: Trash Tells A Story: Characterizing the Solid Waste Stream*. These sessions can be easily adapted for use in the classroom. If, in the course of teaching and implementing these lessons, the school community develops an interest in solid waste management, then teachers may want to read the lesson plans provided in *Section Seven* of this manual.

Math Teachers: Measure the volume and weight of solid waste. Calculate how much waste is generated per person/day, per town/day. Sort waste into categories and calculate the percentages of each kind of waste.

Science Teachers: Practice using the sorting of solid waste to develop the idea of nonbiodegradable classification systems, characteristics and traits. Discuss issues like biodegradable vs. nonbiodegradable. Links between the natural environment and the built environment can be explored.

English as a Second Language: Adapt a text from some of the sessions. Select vocabulary and a grammar point to teach. Use the text in class during a clean-up week.

Geography: Use the mapping exercises in *Sessions 2 and 3*; have students map the community and note landmarks of interest. Develop the idea of pollution in one area spreading to other areas. Use EPA, Turning the Tide on Trash, *Roots and*

Routes of Marine Debris, pp. 19-20, to explore the links between one community's pollution problems and world pollution problems.

Project and Program Managers Working in Urban Sanitation

Project or program managers, including APCDs, already working with urban sanitation issues may use this manual to inform or train field workers.

Initial training in SWM must begin with community entry and assessment skills. Whether a development worker is a foreigner, or part of the community, learning skills to build a community's capacity to identify and propose solutions to their own problems is essential. Community entry and assessment skills are addressed in *Section Five: Raising Our Own Awareness and Building a Community Base.*

Also essential, because many development workers are not specialists in SWM, are some sessions on increasing knowledge about solid waste management and gaining skills in identifying, measuring, and analyzing solid waste. Read *Sessions 1-3.*

Depending on the needs of the community and progress in adopting a solid waste management system, additional information and training in special topics might be needed. To combine solid waste management with business, see *Session 21.* To explore the possibilities of recycling and reusing solid waste, see *Session 22.* To address specific challenges posed by medical waste, hazardous wastes, or used motor oil, see *Session 23. Sessions 24-28* explore additional topics in solid waste management.

Peace Corps Volunteers and Staff

I recommend the following sequence of sessions for all Volunteers whose primary task is not urban environmental management, but who will likely face the challenges of informally managing solid waste in their communities.

Training	Recommended Sessions
PST	*Sessions 1-3* provide an excellent introduction to the solid waste problem and include an experiential activity. For additional background information, see *Session 21.*

I recommend the next sequencing of sessions for Volunteers whose primary task is urban environmental management.

Training	Recommended Sessions
PST	*Sessions 1-3* as introductory sessions to increase awareness of solid waste management issues in developing countries. *Sessions 4-11* to provide skills in communications, community entry, and community assessment and to introduce the notion of a PCV as a facilitator of development *Sessions 12-20* provide scene-setting information relative to getting a community motivated to address their solid waste challenge. PST is normally the time devoted to language acquisition, cross-cultural skills, and other basic needs skills for Volunteers entering a new community in a new culture. As important as technical knowledge is, if Volunteers cannot express themselves in a culturally appropriate manner, all the technical skills will remain untapped. APCDs will be asked to make trade-offs between language and technical skills training.
First IST, after three months at post	Review of *Sessions 18-20*. Volunteers will have likely entered their community and have begun some assessment activities. Using Sessions 18-20 to remind them of different techniques or to problem-solve areas they have already begun to explore will enhance their knowledge and capacity as development workers. Depending on a training needs assessment, conducted before the IST; Volunteers may benefit from some very specific skills training. In addition, they may have identified some counterparts who have specific needs for certain skills too. *Sessions 20, 24-27* have information on specific technical topics related to solid waste management that may interest Volunteers and counterparts. In combination with other skills, such as communications, time management, or cross-cultural adjustments, these technical skills provide an excellent theme for an IST. Addressing technical topics early into a Volunteer's service can sow seeds of ideas that a Volunteer and counterpart may tap into later. With the PACA skills, the complete community motivation and empowerment phenomenon will likely require additional skills enhancement and practice. Combining technical skills while reinforcing community communications skills will increase a Volunteer's confidence and capacity as a development worker.
Second IST, after six months at post	Depending on the needs expressed by Volunteers, one or two of the specialized topics in solid waste management should be introduced. *Session 21, 22 or 23* combined with *24-28* may be appropriate. *Session 21* provides workshop material for a week-long IST focused on business skills. This session works well with budding entrepreneurs. Holding an IST with first-year and second-year Volunteers is a valuable opportunity for exchange of experiences. Although second year Volunteers may not be in a *new skills* learning mode, sharing their experiences with first year Volunteers could prove beneficial on several levels.

Which solid waste sessions to include in follow-up ISTs will depend upon the interests of the Volunteers and community members. For guidance, see the previous section where interdisciplinary recommendations are discussed.

The guidance provided in this section addresses as many different types of questions and situations I can think of. I am sure there are others. Please use this manual creatively and thoroughly. If you have additional recommendations for use, questions, or comments please send them to Peace Corps, OTAPS Water and Sanitation Specialist, 1990 K Street NW, Washington DC, 20526.

How to Conduct a Site Visit for CBSWM Activities Section Three

Project managers interested in placing development workers in sites where community-based solid waste management activities would likely be of benefit frequently express hesitation as to how to proceed. While their instincts and visual inspections of a site may lead them to believe that community members would identify solid waste as a need, approaching townspeople with the idea may provoke consternation.

While capital cities may exhibit all the following characteristics which would seemingly make them ideal sites to begin community-based solid waste management programs, this manual recommends that secondary towns or peri-urban areas (on the fringe of primary cities) be considered instead. This suggestion might make for a lively debate halfway through a training program, or at an IST.

Clues to Identifying a Potential Site Include:

- Presence of paper, plastics, metals, food waste on the ground
- Presence of trash in drainage canals and/or flood zones
- Presence of piles of trash around the town
- Children playing on or in the trash piles
- Trash piles used as latrines
- Evidence of random dump sites on the periphery of an area
- Lack of sanitary landfill
- Local government recently assigned the task of solid waste management but not given any resources (human, financial, mechanical)
- Following a heavy rain, water does not quickly filter into soils because trash blocks filtration
- High incidence of diarrhea, dysentery, and malaria that can be linked to the presence of trash in the neighborhood

Who to Contact

- Capital City - host country government ministries (of the interior, urbanization, water, sanitation, public works, construction, environment, education, and health), or anyone who might have oversight or dealings with regional or municipal level governments. The purpose of these contacts is to gain information and eventual permission-/support to conduct activities at project sites.

- NGOs working in the urban sector with urban sanitation, urban youth, small business development or other urban-based programs.

- Local Level (likely intervention sites) - municipal authorities, health officials, education officials, water and sanitation officials, official and unofficial neighborhood leaders

What to Do

- Call or write for appointments to discuss solid waste and urban sanitation issues with capital city, regional, or local government officials.

- Request meetings with local leaders.

What to Say

- Frankness about the visual inspection

- Incidence of illnesses in the population likely caused by unsanitary conditions

- Discussion of possible community-based approaches to resolve solid waste problems

Indications That a Site Would Provide a Positive Experience for a Development Worker:

- Mayor has demonstrated interest and commitment to solid waste issues in the past, as evidenced by budgetary or other decisions.

- Technical services section of the municipality, if one exists, demonstrates interest in solid waste management.

- Community leaders talk about solid waste as a problem in their neighborhoods.

- Community leaders talk about solid waste as a problem in their neighborhoods.
- Community leaders demonstrate the ability to mobilize their populations to accomplish agreed upon goals.
- Youth leaders identify high unemployment as a concern.
- Business people complain about solid waste but also demonstrate the ability to act jointly to accomplish goals.
- Neighborhood people complain about trash in their streets and fields and express frustration about finding a solution to the problem.
- Women complain about poor health of their children that could be linked to the presence of trash in the streets.

Section Four Planning a Community-Based Solid Waste Management Workshop

Assessing the Situation

At some point, if you are planning on conducting a workshop on community-based solid waste management, someone has done some assessment work to determine that CBSWM is a likely priority in the community. Keep in mind that without community-based assessment, your perception of solid waste as a priority problem is irrelevant. I have therefore included sessions on community assessment in *Section Five*. Depending on the depth of the initial assessment, I may recommend conducting community assessments again. While you may think that another assessment is redundant and a waste of time, I assert that the assessment can serve as much to determine priorities as to get to know community members and build trust.

The community-based assessment method I recommend has activities, called tools, that can be used to prioritize and present information in different formats. Hardly limited to neighborhood surveys, this method has tools that development workers may consider using regularly in their service in the community.

Prior to beginning an actual solid waste management collection system, deliberate and aggressive investigations must occur. The success or failure of a community-based SWM system frequently depends more on community involvement and support than on the technical solutions to the solid waste dilemma.

Two themes need to be addressed and melded in a comprehensive community-based solid waste management program. Technical issues such as organizing a collection system, selecting the site for a landfill, or conveying business skills comprise half the equation. Process issues like community entry and assessment skills, measuring the acquisition of knowledge, and the ability to work with a community in a trusting environment make up the other half of the equation. The latter issues comprise the base from which all technical solutions will develop. In a community-based approach, ideally all solutions will come from the community members. The role of the development worker is to facilitate this process.

This philosophy is reflected in this manual where community-building skills are first addressed in *Section Four*. A development worker needs to build skills in listening, facilitating and partnership-making in order to work effectively in a community.

Section Five presents information and training sessions in technical topics such as working with municipal authorities and increasing business skills of SWM workers. Many community entry methodologies have been espoused with titles like *Rapid Rural [Urban] Appraisal* (RRA/RUA) and *Participatory Rural Analysis* (PRA). Often these techniques are called, or thought to be, participatory when in fact the outsider makes all the judgments and conclusions (PACA 1996). The Participatory Appraisal for Community Action (PACA) methodology, developed by the Women in Development (WID) sector at Peace Corps, has refined the community entry process to place the emphasis of ownership and decision-making on the community members.

This manual recommends using the PACA methodology. For more information see PACA: Some Tools for Building Community Partnerships, Peace Corps, WID, Office of Training and Program Support, Draft Training Materials, April 1996. The session plans in this section represent the most appropriate ones for the challenge of community-based solid waste management and are reproduced directly from the PACA manual.

I have made one assumption about community-based solid waste management for the purposes of this manual: in the course of a community assessment, members will identify solid waste management as a priority. The session plans and information provided herein are intended to assist a development worker with knowledge and skills sufficient to respond to the community's expressed need with confidence and ideas.

Participants

Whom to invite to a workshop largely depends on the goal to be accomplished. Following are some bits of common sense and evidence from different field activities that should help guide the invitee list.

Inviting higher level government officials (i.e., mayors, municipal engineers, regional officials) has the benefit of keeping influential people in the information loop. Later these folks can work to gain approval for activities that might be slightly out of the norm (like CBSWM) and can create allies to draw upon when needed. The downside of inviting higher ups is that they might not come or come for only a part of the event, they might send someone who may or may not have any working or emotional attachment to the subject, and/or while they are present, subordinates might clam up and defer to them, as their superior, because of cultural norms. Finally they are rarely the doers, the action-oriented players that development workers usually work most productively with.

High-level officials are good for opening ceremonies to add credibility to the workshop. Their approval is necessary for the subsequent activities to move forward but their continual presence at a workshop, especially a technical workshop, is not usually crucial.

For a CBSWM workshop, the best people to invite are those who are the most directly impacted by solid waste, those who lack of solid waste management or services and those who are most likely or able to do something about the problem. A non-exhaustive list may include community leaders, families who get sick, parents of sick children, school teachers, political leaders, unemployed youth,* health workers, social workers, municipal sanitation workers and/or people with trash in their yards.

Besides the question of higher ups and the choice of the most impacted persons, the goal of the workshop will further dictate whom to invite.

From a training manager's perspective, target audience members are:

- brand new to development work and solid waste management;
- experienced development workers but new to solid waste management;
- community members who want to help pick up trash;
- community members ignorant of environmental health issues.

Workshop Staff

Hiring trainers for PSTs and ISTs also takes some thought. For PSTs, the ideal trainer is one who has experience in the country, field experience working in the subject area, and previous training experience; feels comfortable in a community-based approach; and is accustomed to multidisciplinary training.

For ISTs, a combination of second-year PCVs, PCV counterparts, host country trainers and APCD supervision comprise the ideal team for ensuring practical, hands-on, skills-building training.

I recommend inviting counterparts to the workshop, especially to ISTs.

PCVs tend to prefer immediate, practical, hands-on training: field trips, trainings up-country at a PCV's site. They work well with a brief and fast-paced format where they get basic information and can follow it up later.

Notes on Training:

- Host country development workers may be accustomed to a different training/learning style than foreign development workers. Trainers need to be prepared to accommodate different preferences and learning styles.

*The subject of youth (unemployed or under-employed) as potential entrepreneurs in a SWM service is developed in Session 21.

- Negotiating a path through multiple learning styles and preferences is challenging but necessary. By having a variety of trainers to express different cultural viewpoints and preferences, the chances of pleasing some of the people some of the time are greater.

- Participants appreciate being informed ahead of time what types of clothes to bring, especially if a training event involves a special kind of dress (i.e., volley ball match, extensive walking around a site, etc.).

- Understanding a potential audience's needs through a pre-training questionnaire can increase the effectiveness and impact of a workshop. In the absence of a pre-training questionnaire, an open-space format can ad-dress specific needs, but the spontaneity of the expressed needs may or may not coincide with the human and textual resources available at the training site.

- Print materials, in the absence of or in conjunction with field visits, can enhance a training session. A weakness in international publications is that the illustrations are likely to be region specific. If images do not resemble people in your region, I highly recommend finding images from your region or not using those images at all.

Training Materials

Materials usually include flip charts, markers, and masking tape. A computer, printer, and photocopier would all be useful tools for compilation of daily notes, and in the design of flip charts and handouts. Host country participants appreciate certificates of accomplishment. Preassembled folders with the agenda of the workshop, a writing pad, and pen or pencil ensure that all participants have the same basic materials to start off the workshop. Prepare all documents in advance.

Guest speakers can enhance a workshop immensely.

Depending on the training location, a vehicle may be needed to transport people to community sites or meetings.

Training Site Selection

The venue for classroom training in CBSWM should include a large meeting room, enough chairs for everyone, and breakout rooms or spaces for small group work.

Up-country (i.e., outside the capital city) sites may provide an atmosphere replete with opportunities for observation of real activities and fewer distractions than the capital city, and may be less expense than a capital city facility. Sometimes up-country sites do not have photocopiers, nor have ready access to a catered hotel and other amenities.

The field portion of a workshop is ideally in a neighborhood close to the training site, where folks have had positive contact with development workers, and where community members are interested in SWM and willing to participate in your exercises. The venue should also have a large meeting area and small-group work areas. These can be covered pavilions or, as is common in Senegal, a palaver tree.

A note of caution, however, must be sounded. Training organizers must weigh the costs and benefits of engaging host country communities in activities that may increase expectations above and beyond what is possible to achieve during a limited-term training session.

Raising Our Own Awareness and Building a Community Base Section Five

Overview

- *Sessions 1, 2 and 3* provide information and activities to increase knowledge and experience in solid waste management.
- *Sessions 4-11* train participants in community assessment skills and provide tools for working in partnership with community members.

Note: Handouts are at the end of each section.

Session 1 A Shocking World View of Trash

Overview
Orient the participants to the world solid waste management challenge by providing information. Introduce concepts of environmental health.

Total Time: 1.5 hours

Objectives: Participants will
1. Gain knowledge about worldwide trends in solid waste management, statistics about SW, environmental health concerns, and why trash is not often collected.
2. Demonstrate an understanding of the relevance of the solid waste problem at the local level.

Resources
- Handout, A Shocking World View of Trash, page 26-27
- Flip chart, markers

Trainers' Notes
The text is in the participant's guide. A discussion may include aspects of SWM in the participant's home town or the training site's town, depending on the familiarity with the town.

Procedure
1. Trainers discuss with participants the differences between solid waste and liquid waste.

Solid waste should not be confused with liquid waste, a more familiar sanitation topic. Solid waste refers to waste generated in households, commercial establishments, institutions, and light industries. Heavy industrial wastes, agricultural wastes, mining wastes, and sewage sludge are not part of solid waste discussed in this manual. The terms solid waste, trash, community solid waste, and municipal solid waste, in this document, are used interchangeably.

Liquid waste, by contrast, include all wastes from human (and sometimes animal) excrement and used water from households including kitchen and shower water, also called gray water. Training materials for treating liquid wastes can be found under the categories of sanitation, sewage, latrines, and waste water.

2. Trainers ask group the following questions:

   - What happens in your town to SW that is not collected?
   - Do people in your town get sick with malaria? diarrhea? dysentery?
   - Who is supposed to collect the SW?
   - How much SW do you think is collected?
   - Currently national, regional, and municipal strategies for managing solid waste focus on four key concepts:
     - waste minimization
     - recycle and reuse
     - incineration
     - landfill

     Define and discuss each concept. How do you think these four concepts can be applied in the community, the region, and the country?
   - Can you describe a town where no trash is ever collected?
     - Why doesn't it get collected?
     - What will the town look like?
     - What will the people look like?
   - Can you describe a town where trash is collected?
     - Why does it get collected?
     - What will the town look like?
     - What will people look like?

- How do you get from the first scenario to the second? (This training guide will provide suggestions and a framework for getting from no services/SW problem to provision of services/improved health of citizens.)

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A Shocking World View of Trash

More Trash Generated Than Collected

The growing volume of waste spawned by the consumption inherent in city life is a formidable challenge to cities in developing and developed countries alike. For low-income cities, the main solid waste problem is how to extend collection services to the poor - often 50% of the population is without service. Improving efficiency in these cities is key, because waste management often accounts for 30 to 50% of operational budgets [of the municipal government], yet collects only 50 to 80% of the refuse generated (World Resources A Guide to the Global Environment 1996, p. 111).

The amount of domestic refuse collected varies widely, depending on many factors such as standard of living and eating habits. [In] tropical cities it usually varies between about 0.3 and 1 kg/person/day (Cairncross 1993).

If Waste Is Not Collected, What Is The Harm? Won't The Rain Wash It Away?

Environmental health is a term used to describe conditions around us that have an impact on our physical health. When solid waste is not collected a number of health hazards increase and become dangerous to citizens. Accumulated solid waste at the household level can provide a home for rodents and insects. Rats have been known to transmit a contingent of diseases such as plague, murine typhus, leptospirosis, histoplasmosis, rat-bite fever, salmonellosis, tularaemia, trichinosis, and many other diseases (Feachem 1977). Insects in a complex transmission route, can transmit bacillary dysentery, amebic dysentery and diarrheoal disease. Flies thrive on food wastes and breed in garbage heaps and in trash on the ground. Mosquitoes breeding in stagnant water around trash heaps cause malaria and worse, dengue fever. Larger animals will gravitate towards trash piles in search of food. Food scraps, paper, tree and grass cuttings and insects are all things that cows, goats, and chickens like to eat. Animals defecate in the trash, further contributing material to the disease transmission cycle.

Trash thrown onto the street can block drainage channels which in turn trap water providing a home for malaria-producing mosquitoes. Blocked canals cannot carry rain or household water away.

Ground and Surface Water Contamination and Soil Contamination

Solid waste collected and deposited at a site chosen at random may result in ground water or soil contamination. Refuse may contain substances that are harmful to soil and water. That means that drinking water sources could become irrevocably polluted. Contaminated soils may yield less or

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inferior harvests; worse, contaminated food unfit for consumption. Dumps located too close to residential areas pose the same problems as accumulated trash in a household. In countries where solid waste has a high hazardous materials content, many precautions must be taken to protect the land surrounding and under a dump site.

Children and Trash

Trash piles hold endless treasures for children who like to play in them and pick though trash looking for cast-offs they can use for other toys.
Children are more exposed to the unhealthy impacts of accumulated solid waste than adults. Children also sometimes use the trash piles as toilets. Children who play in or around trash piles where there is also fecal matter are very likely to become ill. A simple cut from metal can lead to tetanus and death. In Niger only 20% of 1 year old children were immunized against tetanus; 48% in Ghana, 58% in Uzbekistan, 94% in Honduras, and 88% in the Philippines (State of the World's Children 1995). A cut from a shard of medical glass left untreated, could become infected with a staph infection leading to ulcerating sores and even gangrene.

It is true that the presence of solid waste is not the only cause of sickness for people. Other factors such as water quality, food preparation and handling techniques and the general health of an individual contribute to the overall well-being of a person. Nevertheless, the presence of solid waste in and around the home, on the streets, in the drainage canals, piled up at the side of the road can all contribute to poor environmental health conditions.

Session 2 Assessing the Site and the Situation

Overview
Getting to know the site and current sociology of solid waste management

Total Time: 2 hours (site visit plus classroom debrief)

Objectives
The participants will get to know the town by conducting a mapping exercise and by observing who does what and when with trash.

Resources
- Invite some counterparts or host country trainers to accompany on walking tour, especially if language skills of PCVs are weak or if participants are newly arrived and don't know the site.
- Flip charts, markers
- If maps of the town are available and the town is very big, the trainers should use them to divide the town into manageable walking-distance areas, but town maps are not an acceptable substitute for the exercise.
- Transport may be required if sites are not in walking distance from training site.

Special Note for Peace Corps Training
This exercise can be conducted later in a training event to combine PCV and counterparts, communications skills, and site discovery skills. In Côte d'Ivoire, this exercise is used after participants complete 9 weeks of PST in a third country and then come to Côte d'Ivoire. For several days, participants and their eventual counterparts are paired in various training tasks. Because the trainee is still in training and not at site, but is itching to know the site, the counterpart describes the site and the PCV draws it. Counterparts must not take the pen and do it themselves. The PCV/counterpart team will then have a resource upon arrival at site. PCV can then ground truth the map while getting to know the actual town, noting special sites of SW or other environmental health hazards, etc.

Trainers' Notes
This activity gets participants out of the classroom. Pairing participants might lessen the potential stress of this exercise. Ensure that they are prepared for this with:
- practical weather proof clothes
- adequate local language abilities (or accompanied by a host country person)
- sufficient crossing-cultures skills to conduct observations in a new territory

If participants will be visiting an official dump site, the trainers must ensure that permission is granted prior to the visit.

Procedure

- Discuss common mapping symbols.
- Divide the group into small teams. Give each team flip chart paper, markers, and a surface to write on.
- Instruct them to map the town as they see it. If the town is too large, the training organizer should divide it somehow and communicate to participants which part they should map.
- Participant teams set out on a walking tour of the town. In addition to noting streets, residential, and business areas, hospital, and schools, participants also note eye-level characteristics of town (such as official and unofficial dump sites, drainage systems, clogged drains, latrines, open human waste sites, etc.).
- Regroup and talk about findings.
- Put maps on the wall. If the town was divided, have participants join maps and construct a whole-town view.
- Discuss findings. Note any special local vocabulary relating to municipal solid waste (MSW). For example. in Côte d'Ivoire unofficial trash piles are called *tas sauvage*, or wild piles.

Session 3 Trash Tells a Story...Characterizing the Solid Waste Stream

Overview
The volume and content of solid waste dictates what can be done with it. Learning how to calculate volume and weight of trash as well as classifying its elements is a first step in the management process.

Time: 1 hour plus field visit

Objectives
1. To provide participants with a method for calculating the volume and weight of solid waste.
2. To learn to characterize solid waste's various components including recyclable materials, compostable materials, re-use articles, and just plain refuse.

Resources
- Plastic sheeting to protect the floor
- Bags to put trash samples in (one per group or participant). Use standard-sized bags to make volume measuring easier.
- Flip charts, markers
- Baby scale or scale to weigh trash samples
- Protective clothing (closed-toe shoes, gloves, long-sleeved shirt, long pants)

Trainers' Notes
This session gets participants into the town. If participants' language skills are still developing, have translators accompany them. Participants are going to be asking people if they can take some of their trash, so be sure to provide language and crossing-cultures skills to make this possible and problem-free. If participants are staying with families, perhaps they might take their hosts' trash. Be sure to get trash samples from around the city.

Procedure
A. Field Work. Instruct participants to take a plastic bag and go out again, to a specific MSW dumping site to observe for one hour. They should describe what they see, including:

- What is going on at the site?
- Who is going to it or coming from it?

- If anyone is around whom they might ask a few questions of, see what can be discovered. Specifically, when someone comes to the dump, Trainees should
  - ask to take their trash
  - ask how long they have been collecting it
  - ask how many people contributed to it

B. After returning to the training site, one-by-one Trainees should weigh their samples, and then dump them on the floor.

- Locate on the map where the trash came from.

- Calculate
  - How much does the trash weigh?
  - By what volume does the trash weigh?
  - How many people contributed to that trash bag?
  - Calculate kg/day/person.
  - Try to determine how much trash is produced by the city per day based on the composite samples.

- Characterize
  1. What is in the trash?

     a. Separate the recyclable materials by paper, glass, metals, and plastics.

     b. Are there any biodegradable products such as vegetable peels, lawn clippings, leftover food?

     c. Any hazardous materials like batteries, aerosol cans, etc.?

     d. Any reusable items (as is) like flip-flops?

     e. Weigh each separated portion of the trash sample to get the percentage.

- Conclusions. After each sample is analyzed, can the group draw any conclusions about trash for the whole town? Does the content of the trash vary by area?

C. Trainers lead discussion about the solid waste that was observed. Use the following questions:

1. How long had the solid waste been there?

2. Was it contained in a bucket, a bin, a receptacle, or dumped on the ground?

3. Where did the SW come from? (household, market, unidentifiable)

4. Who brought the SW to the pile?

5. Did anyone (like municipal trash collectors) come by and pick it up? Who? With what frequency do they come by?

6. Does any other kind of SW management strategy (such as scavenging, burning) take place? By whom? With what frequency?

7. What were the contents of the trash pile? Do you think the contents will change according to the season? Do you think the volume or weight will change with the season?

8. What kinds of conclusions can you make about the trash pile, its origins, what happens to it on a daily/weekly basis, who contributes to it, or attempts to manage it?

D. Begin formulating a town description of existing SWM conditions and capabilities.

- Keep weekly records of the type and estimated quantity of solid waste.
- Begin to formulate a social sketch of how trash is handled at the household level.

Asking Questions* Session 4

Overview
Observation and mapping are two ways to gather information, there are many other methods including surveys, questionnaires, assessments and analysis.

Total Time: 3 hours

Objectives
To provide development workers with tools for data collection.

Resources
- Flip charts, markers
- Handout, **Asking Questions Worksheet**, page 38

Trainers' Notes
This five-part session forms part of the base of skills necessary for PACA (Participatory Analysis for Community Action). In order to provide whole-PACA training, *Sessions 4 through 11* must be completed.

Crossing-cultures skills are very important. Participants need to have sufficient awareness of the culture to appreciate how to best ask questions.

This session is very comprehensive. The trainers may omit parts depending on the capabilities of the participants. Some parts of this session may be assigned as independent study.

Procedure

Part 1: Types of Questions

Ask the participants to give a definition of open-ended, closed-ended, and leading questions.

- **An open-ended question is one which permits the respondent to answer according to his/her preference.**

* Adapted from Booth 1995.

- **A closed-ended question is one where a yes or no answer will most likely be given.**

- **A leading question clues the respondent to provide the *correct* answer.**

Write their words on flip chart paper. Ask the participants to give examples of each type of question in English and then in the language in which they will be working.

- Emphasize that they should try to use more open-ended than closed-ended questions to understand what people do and why. They may start with a closed-ended question, but should then ask an open-ended question to explore further and to understand the reasons community members act or believe the way they do.

- Emphasize that they should not ask any leading questions. Leading questions do not allow community members to tell what they really think and know. They encourage community members to say that they agree with the development worker, even if they don't.

Ask a cross-cultural resource person to discuss cultural factors related to asking questions in the country/region/community in which your training is being conducted. Ask your resource person to discuss why community members will tell development workers what they think the development workers want to hear. Discuss what can be done to change this conduct.

Part 2: Identifying and Writing *Open-Ended* and *Closed-Ended* Questions

Review the handout **Asking Questions Worksheet**, on page 38. Decide if each question is open-ended, closed-ended, or leading.

Part 3: Practice Asking Questions

Ask the participants to make an *Asking Questions Observation Checklist* with three columns on a piece of paper, as illustrated on the following page.

Divide the participants into groups of four participants each. If counterparts are present at the training, have two Volunteer/counterpart pairs work together. Each group defines the topic they will talk about. One person in each group asks questions, one answers, and two observe.

The person asking questions will practice using open-ended questions to obtain information from others in the group. Questioners finding themselves asking a closed-ended question should review **How to Ask Questions**, on page 37. Do not ask leading questions.

Asking Questions Observation Checklist

Number of Open-Ended Questions	Number of Closed-Ended Questions	Number of Leading Questions

Observers should decide if each question is an open-ended, closed-ended, or leading question, then complete the observation checklist by placing a mark in the appropriate column each time the person asks a question.

After five minutes, observers should give feedback to those asking questions on how well they used open-ended and closed-ended questions.

Teach or remind the participants how to give good feedback.

Rotate roles until each person in the group has practiced asking questions at least once. Try to ask questions in the host-country language. Try to ask questions of a nontrainee.

Part 4: Probing Techniques

Ask participants to list and define the four probing techniques discussed in their handouts and write them on flip chart paper.

Discuss why probing techniques are important.

Part 5: Practice Using Probing Techniques

Review the *Asking Questions Observation Checklist.*

Divide the participants into small groups of four participants each. For Peace Corps training, if counterparts are present, have two Volunteer/counterpart pairs work together.

Each group defines the topics they will discuss. As in the previous exercise, one person in each group asks questions, one answers the questions, and two observe.

The person asking questions should try to use all three probing techniques discussed. Practice should also continue on using open-ended questions. No leading questions should be asked.

The observers should complete the *Asking Questions Observation Checklist* by recording all actions observed on the list. Record each time the person being observed asks an open-ended, closed-ended. and leading question.

After five minutes, observers should give feedback to the person asking questions, including how well the probing techniques and open-ended questions were employed.

Remind the participants how to give good feedback.

Rotate roles until each person in the group has practiced using probing techniques at least twice.

How to Ask Questions

Knowing how to ask questions is one of the most important skills a development worker can learn. The questions you ask and how you ask them will determine what and how much you are able to learn from and communicate with community members. You will be able to learn and communicate just about anything if you ask the right questions in the right way. Some of the types of questions you will be asking include the following:

- Experience/behavior questions help you find out about what a person does or has done to obtain descriptions of experiences, behaviors, actions, and activities that would have been observable if the observer had been present.

- Opinion/value questions help you understand people's goals, intentions, desires, and values.

- Feeling questions help you understand emotional responses to a person's experiences and thoughts.

- Knowledge questions help you find out what factual information the person knows.

- Sensory questions help you determine what is seen, heard, touched, tasted, and smelled.

- Background/demographic questions help you understand the person with whom you are speaking in relation to other people.

Exploring People's Answers - Probing Techniques

When you begin talking with community members, you might find that you need to clarify details of what they are saying. People will not tell you everything all at once. This is particularly true if this is the first time you have talked with the person about what s/he does and how s/he thinks and feels.

The questions you ask and the probing techniques you use will depend on what the person has already told you.

Several probing techniques you can use to explore a person's answers are as follows:

- Remain silent
- Repeat the person's words as a question.
- Ask the person to place her/himself in the position of somebody else.
- Ask the person to explain further.

Ask each Trainee to read one of his/her examples of open-ended and closed-ended questions. The group should decide whether s/he has phrased it correctly. Participants should make corrections if necessary. Try formulating questions in the new language.

Asking Questions Worksheet

Decide if each question is open-ended, closed-ended, or leading, and write your answer in the blank. (Answers are listed below the blanks.)

1. _____ How long has that trash pile been there?
   closed

2. _____ Don't you think that the trash pile should be removed?
   leading

3. _____ Why do you think that the trash pile accumulates there?
   open

4. _____ How often does the trash pile get picked up?
   closed

5. _____ Explain what happens when you have trash at your house.
   open

6. _____ Does your daughter take the trash to the trash pile?
   leading, closed

7. _____ Isn't it true that women are responsible for cleaning up the trash?
   leading

8. _____ Tell me about who comes to the trash pile.
   open

9. _____ What problems have you had when you asked someone to pick up the trash?
   leading, open

10. _____ How many times per day do you go to dump trash at the pile?
    closed

11. _____ Do you think that the trash pile is having a negative impact on the health of your family?
    leading

12. _____ Does the municipal dump have scavengers?
    closed

Facilitating a Group Discussion* Session 5

Overview
This session introduces participants to the skills necessary for facilitating a group discussion and gives them practice applying those skills in role plays.

Total Time: 3 hours, 45 minutes

Objectives: After the session, the participants will be able to:
1. Describe at least three facilitating skills, including questioning, paraphrasing, and summarizing
2. Describe two ways to encourage a timid group member to participate
3. Describe two ways to discourage a group member from dominating the discussion
4. Describe and demonstrate the three steps of facilitating a group discussion
5. Apply the *Facilitating a Group Discussion* checklist and give feedback to other participants on their skills

Resources
- Handout, **How to Facilitate a Group Discussion,** pages 42-45. Ask participants to read the handout before the session, and note the comments and questions they would like to discuss.
- Handout, **Checklist for Facilitating a Group Discussion**, page 46
- Flip charts and markers

Trainers' Notes
Facilitation skills are also addressed in *Session 6* and linked into the presentation of PACA methodology. Trainers should use one or the other session, but not both.

Procedure
Activity 1: Introduction to Facilitating a Group Discussion

1. Review the skills needed to facilitate a group discussion.

2. Write each skill on flip chart paper and ask the participants to discuss each one. Ask for, and answer questions.

3. Review the three parts of a group discussion (opening, discussion, summary).

4. Write each one on flip chart paper, and ask participants to discuss them.

* Adapted from Booth 1995.

5. Explain that the participants will now practice facilitating a group discussion.
6. Brainstorm ideas the groups can discuss; these could be any problems or activities that might be relevant to the group and for which they should arrive at a consensus for action.

Facilitation Skills

Asking Questions

Paraphrasing

Summarizing

Involving Everyone in a Group

Other Skills

Activity 2: Practice Group Discussion

1. Divide the participants into groups of eight. (For Peace Corps training, if counterparts are present at the training, assign four Volunteer/counterpart pairs to work together.)

2. One person in each group will facilitate the discussion. Two people will be the observers, apply the checklist, and give feedback to the facilitator, citing what was done well and what could be done next time to improve. The rest will be participants in the group.

3. Each group session should last 15 minutes and have about 5 minutes for feedback.

Warn the facilitators when 10 minutes have passed so they can move into summarizing and closing the group session. This schedule will give everyone a chance to practice. Rotate until everyone has a chance to facilitate a group.

Emphasize that since this is the first time they are facilitating a group discussion, the participants are not expected to use all of the facilitation skills. However, they should try to do all of the steps.

Activity 3: Process, Generalization, Session Evaluation, and Community Practice Assignment

If time allows and participants' language skills are at an appropriate level, ask them to work in pairs to organize and do a group discussion session with community members on a previously specified topic.

- Have one participant facilitate and the other observe and give feedback.
- For Peace Corps training, if counterparts are participating, have the Volunteers work with their counterparts.
- Set a date for a follow-up session, during which you review their experiences, compare checklists, give feedback, process and generalize.

handout

How to Facilitate a Group Discussion

One of your roles as a development worker will be to facilitate group discussions to help community members identify and solve their own problems. A group discussion session provides an excellent technique for meeting the following objectives:

- Providing individuals who have common needs or problems an opportunity to share experiences and work together to identify and try solutions.

- Creating a supportive group environment in which participants can encourage each other to take action to solve a problem.

Regardless of the objective of the session, the skills you use and the steps of the process are the same.

FACILITATION SKILLS

Asking Questions. When you are facilitating, you will need to use open-ended questions, closed-ended questions, and probing techniques to help participants talk about their experiences and identify solutions. Be careful not to use any leading questions, since the objective of the session is to help participants reach their own conclusions, not yours.

Paraphrasing. By paraphrasing, you demonstrate that you understand what the other person has said and help clarify ideas. The process of paraphrasing is very much like catching a ball and throwing one back. The best way to paraphrase is to listen intently to what the other is saying. If while the other person is talking, you worry about what you are going to say next, you are not likely to hear enough of the message to paraphrase it correctly.

Summarizing. The purpose of summarizing is to pull important ideas, facts, or information together; establish a basis for further discussion or make a transition; review progress; and/or check for clarity or agreement. Summarizing requires you to listen carefully in order to organize and present information systematically. Summarized information ensures that everyone is clear about what transpired in that portion of the discussion. Some starter phrases to help you begin a summary are:

"There seem to be some key ideas expressed here..."

"If I understand, you feel this way about the situation..."

"I think we agree on this decision. What we are saying is that we intend to..."

One of the most important roles of summarizing is that it gives you an opportunity to check for agreement. If people do not agree, it is better for you (and for them) to know during the discussion than to find out later when what the group supposedly agreed on does not happen. One of the most common frustrations development workers have is that they think agreement was reached to do something, yet things do not occur as planned afterwards. In many instances, that is because participants really were not in agreement during the discussion.

Involving Everyone in the Group. In every group discussion, there will be some people who will want to talk a great deal and some who will be much more timid. Your job as facilitator is to ensure that everyone has an opportunity to discuss their experiences and to contribute to the decisions the group makes. Some ways to ensure that everyone participates include the following:

Dominant Participants

- Avoid eye contact, or turn your body slightly away from the person.
- Call on other people by name and ask for their opinions.
- If necessary, politely thank overbearing participants for their opinions and say that you'd like to have the ideas of other group members as well.

Timid Participants

- Use eye contact to pull the timid participant into the discussion. Look at people directly when you ask questions.
- Observe timid participants closely to see when they are ready to speak.
- Ask easy, nonthreatening questions that encourages direct response. If participants become too ill at ease, continue the discussion with others, coming back to shy group members later.

Leader Participants

- Be aware if one of the participants of the group is considered to be an *informal leader*. The other participants will frequently defer to this person and wait for decisions to be made.

- Use the techniques for the timid participant mentioned above to involve other members. However, it will be important not to insult the informal leader. Frequently, if this person says that the group will do something, they really will.

A number of other helpful facilitation skills, some verbal and some nonverbal, include the following:

- Nodding one's head
- Picking up on the last word or two of someone else's sentence
- Repeating a sentence or part of a sentence
- Asking someone to, "*say more about that...*"
- Maintaining eye contact, open body position

STEPS OF A GROUP DISCUSSION

Step 1. Create a Comfortable, Personal Environment. Arrange for the meeting to be in a convenient place that has as few distractions as possible. Greet people in a culturally appropriate manner. Ask them to sit in a circle or semicircle to break down the teacher/student atmosphere. Wait a reasonable amount of time until most or all of the invited participants are assembled. If appropriate, use an icebreaker or group dynamic exercise to motivate the group to open the discussion.

Step 2. Opening. Introduce the purpose for which the group has gathered and briefly share your observations about the common problem the participants share. Ask group members what they think about the problem. Emphasize that the group is here to work together to solve the problem. The participants should feel free to say whatever is on their minds and expect to learn from and help each other. If it has not been decided before hand, ask the group how long they would like to meet and establish, as a group, the time the meeting will end.

Step 3. Discussion. Return to the purpose of the meeting and facilitate the discussion using all of the skills described above. Some of the topics you might discuss include the following:

- Why does this problem exist?
- What have other people done to solve the problem? What was successful?
- What could we learn from it?

- What new ideas does the group have?

- How can we go about trying these ideas?

It is natural for a group discussion to go in many directions. You should not worry too much if the discussion turns from the proposed topic to another one. Part of the supportive environment of the group is generated when people feel free to talk together as friends. Wait for a time and then reintroduce the topic, starting from where the group left off.

Participants may not resolve their problems in one sitting. Be careful not to push the group to make a decision before they are ready. At the same time, help participants to organize their ideas and actions. Being a facilitator is a balancing act!

Step 4. Summary And Closing. Ask participants to summarize what they decided during the session and what they will do next. Establish a date and time for the next meeting or activity. Finally, thank them for participating.

The following checklist will help you to plan and facilitate a group discussion. You can also use it to teach other people how to plan and facilitate a group discussion.

Checklist for Facilitating a Group Discussion

A facilitator should...

Create a comfortable, safe, and personal environment.

_____ Arrange for the meeting in a convenient place that has as few distractions as possible.
_____ Greet people in a culturally appropriate manner.
_____ Seat people in a circle or semicircle.
_____ Use an icebreaker or group dynamic exercise to motivate the group (if appropriate).

Opening

_____ Introduce the purpose for which the group has gathered.
_____ Very briefly share observations about the common problem the participants share.
_____ Seek confirmation that this problem is in fact common to all.
_____ Emphasize that the group is here to work together to solve the problem.
(The participants should feel free to say whatever is on their minds and expect to learn from and help each other).
_____ If it has not been decided before hand, ask the group how long they would like to meet today and establish, as a group, the time the meeting will end.

Discussion

_____ Return to the purpose of the meeting and facilitate the discussion.
_____ Ask why this problem exists.
_____ Ask what other people have done to solve the problem. Ask what was successful. Ask what they could learn from it.
_____ Ask if the group has any new ideas. Ask how they can go about trying these ideas.
_____ Use open-ended questions, closed-ended questions, and probing techniques to understand everyone's experience and ideas.
_____ Use no leading questions.
_____ Paraphrase to demonstrate that you understand what the other person said and to help clarify ideas.
_____ Summarize to pull important ideas together, clarify, and check for agreement.
_____ Involve everyone in the group.
_____ Permit the group to *stray from the topic,* but then reintroduce it, starting from where the group left off.

Summary and Closing

_____ End the meeting on time or when the participants appear to be restless or uncomfortable.
_____ Ask participants to summarize what they have learned.
_____ Ask participants to summarize what they have decided to do next.
_____ Establish a date and time for the next meeting or activity.
_____ Thank the group for their participation.

Participatory Analysis for Community Action
Introduction to PACA Methodology
Session 6

Overview
This session introduces methods of initiating Participatory Analysis for Community Action (PACA).* The central message of this session is that PACA is a data-gathering method that achieves its objective only when local community members come to feel that they are active partners in the reflective process, that is, they appropriate the data-gathering mission as their own. This session presents the methodology, then introduces the essential communication skills required for the effective use of the different PACA techniques.

PACA is an excellent community building and assessment tool but it requires a certain number of skills on the part of the development worker and sensitivity to some aspects of implementation. The development worker using this technique should be reasonably fluent in the language that the community will be speaking. Development workers who need interpreters must make arrangements ahead of time.

PACA is a process that can work to engage and motivate a community to act. While this is a great thing, care should be taken not to motivate a community that will not have any follow up by outside development workers, such as PCVs.

Total Time: 2 hours - for several days

Goal 1: To introduce *Participatory Analysis for Community Action* methodology.
Objectives:
1. To identify the essential elements of the PACA methodology
2. To emphasize the relevance of PACA to the Peace Corps context, especially the gender analysis
3. To introduce a range of relevant PACA techniques

Goal 2: To review and practice the skills essential to PACA techniques.
Objectives
1. To review and practice essential individual and group communication skills
2. To demonstrate the importance of effective and systematic observation

Resources
- Flip charts, markers, masking tape
- Cultural informants (crossing cultures specialists, language teachers)
- Handout, **Topic Outline for Community Field Work**, pages 61-62
- Additional resources for all PACA activities are located in the bibliography

* Adapted from PACA 1996.

Special Notes
Using PACA during PST to teach the skills and methodology is a good idea. Participants can either practice the methodology in English on each other or in a new language on language trainers or training center staff. Trainers must carefully assess if participants have enough language skills to use the methodology on host country community members.

We do not necessarily recommend using the PACA tools in the communities during PST because frequently PSTs take place at a locale which is NOT the site of the Volunteer. However, if Trainees are at their own sites, and providing language and cultural skills are adequate, there is no reason why they cannot use these skills in their communities.

If the PST design allows, a counterpart workshop at the end which includes PACA methodology, has the advantage of training the counterparts, reinforcing methodologies for the PC Trainees (but likely using a new language), and providing a community entry methodology for the Volunteers once they arrives at their sites.

Limiting PACA activities during PST to practice sessions in the immediate training community is not ideal but delaying PACA training (or any community entry/assessment training) until 3-6 months after PST is likely a worse option. By that time a Volunteer will have already done some sort of entry/assessment activity.

Trainers' Notes
This is a long and complex session that requires careful organization and a sense of flow. It is critical that the trainers maintain a rhythm and refer back regularly to the theme and central focus of the session: the review and practice of those skills that permit the effective application of the PACA method. The session has two participant activities and has the option of using several visual aids, including a slide projector, a video cassette player, transparencies and/or the flip chart. Trainers should review all these materials before the presentation.

Trainers need to be clear about the differences between PACA, PRA and RRA. There are several source books on PRA which will help with the tools that will be introduced.

Participants will undoubtedly bring some experience to parts of this session. It is critical to recognize their experience, and, as necessary, show how it differs from the new concepts or is enhanced by the additional skill practice.

For interviewing practice, determine behaviors you wish to emphasize and prepare the slips of paper to instruct participants on their roles ahead of time.

Activity 1: Presentation of the PACA methodology

1. Trainers asks:

   - What is your experience with participatory methodologies?

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- Have any of you used *Participation Analysis For Community Action*, *Rapid Rural Appraisal*, or *Participatory Rural Appraisal*? If so,
  - How did you use the techniques?
  - For what purpose did you use it?
  - How did you do it?

Often techniques are called participatory when in fact it is the outsider making the judgments and conclusions. Take participants' examples without making judgments about them.

2. Make a flip chart as shown below to use as a focus for a PACA lecturette.

P A C A

Participatory Analysis
for
Community Action

What? Who? Where? How? When?

Defining PACA

What is PACA?

We use the term *Participatory Analysis For Community Action* to mean a methodology designed to communicate information, identify needs, and lay the groundwork for community action to solve problems. It facilitates the develpment of an effective and open partnership between development agents and the representative segments of the local community to design, implement, and evaluate development programs.

Who uses PACA? With whom?

Development agents, such as Peace Corps Volunteers, health extension workers, community leaders, carry out PACA in full partnership with the different sectors of the local population who represent the class, status, gender, and ethnic variation in the community. The sample of people is an important factor; both men and women must be represented.

Where is PACA used?

The PACA methodology is implemented in the local communities, in neighborhoods, and in households where the target population resides. Community is not limited to a geographical location. PACA tools can be used in neighborhoods or sections of larger towns, institutions, and affinity groups whose members may live in several geographic areas but share a common interest.

Why use PACA?

PACA is a useful tool for identifying local constraints and opportunities, for establishing local needs assessments, for generating program and project ideas and planning, and for evaluating or monitoring the progress of existing programs and projects.

PACA tools, such as community mapping, identify how women and men view their community. The PACA methodology will suggest who should assume what role in SWM.

How is PACA carried out?

PACA relies on the active and full participation of the local community with the development worker to elicit a partnership rather than impose an agenda.

Part of the PA (participatory analysis) process can be relatively rapid, involving one or more staff visits to a community. The CA (community action) will take longer and may be the focus of a development workers' assignment over several years.

When is PA carried out?

PA is ideally carried out prior to a project design. It might also be carried out after development workers are assigned to communities to get a better idea of their community's situation, either in general or in reference to a special aspect, such as water supply. Or, it may be carried out at different points of evaluation during a project.

Specific visits by outsiders to the community for *participatory analysis* should be timed so as not to coincide with periods of concentrated labor demand in local activities.

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3. Ask: *What are the differences between this approach and ones you have used before?*

Refer to examples that began the session. The biggest difference should be that the PACA methodology has the outsider facilitating the community's own assessment.

This method presents a research problem, or an issue, to the community, then seeks to encourage the community to appropriate the research problem as its own. Ideally, at this point, the activity (in essence an information gathering exercise) becomes a tool of empowerment, and the community assumes the research task as its own.

This technique makes use of all the important skills of communication, and perhaps adds some new ones, or at least emphasizes some that we may not often use. For that reason, we are going to look at those skills in an isolated way, and to do some practice to hone those skills before using them in the community.

Participatory Analysis for Community Action

Key Elements

- Interviewing separate groups of the community, e.g., men, women, and youth.
- Facilitating their discussion in small and large groups.
- Formatting their ideas visually.
- Helping them compare and contrast their own perceptions, e.g., as men and women.
- Using their own analysis for project design, site selection and/or facilitating their own community action.

Activity 2: Communication and Information-Gathering Skills: Interviewing

A. Interview Techniques

1. The interview can be an intimate activity. The questions that development workers ask usually concern fairly personal topics. As most of us know, conducting a good interview is much more difficult than we tend to imagine.

   Trainer conducts a quick demonstration:

   - Walk up to one or two participants, introduce yourself (name only) and ask a few questions. Use questions that might seem somewhat invasive if asked by a complete stranger, such as, "Do you have brothers and sisters? How much money do you make per year? What does your father do?"

   - Ask the participants who were approached how they felt, list their comments on a flip chart. Then, ask the participants observing the interaction how they felt and list their comments.

   - Explain that in this session participants will learn about culturally appropriate ways to establish rapport and ask questions.

   - Ask what are the results of asking inappropriate questions? Use notes from the introductory exercise.

   - State that asking questions, or more formally interviewing people, is the form of communication most basic to getting to know people. We use it constantly as we meet new people. If done well, we can:

... establish trust,

... create a human bond, and

... begin a partnership between ourselves

and those we came to work with.

2. In the implementation of the PACA, two kinds of interviews are common: individual or household interviews and focus group interviews.

The skills for these two types, while slightly different, share many of the same characteristics, such as the following: (Review good interviewing techniques.)

Trainers' Note: If soliciting answers to the questions posed below, and throughout this activity would take too long, then using this material as a resource, and either asking for Trainees examples, or introducing these notions as a lecturette might make more sense. Remember, it is probable that your participants know these things. It would be easy to insult participants without this acknowledging this.

a. The introduction to the interview is critical. The overriding principle is as simple as it is important: **demonstrate respect** for the intelligence of the interviewee(s).

- What are some ways you have displayed respect to other people? (Answers may include behavior, dress, use of titles, handshake technique.)

b. How would you **develop rapport** with someone at home? (Initial questions, statements, behaviors) A development worker may be an outsider to the community or even foreign to the country. It is important to try to dispel all false or misinterpretable expectations that this status might bring.

- What are the attitudes towards foreigners here?
- Do they vary according to where in the country you are?
- Do they vary by social classes, gender, age, or ethnic group?

- What are ways to begin to develop rapport through behavior, conversation, and questions that are nonthreatening? (Get input from cultural informants.)

c. Use **familiar, nonthreatening topics**. The topics that are familiar and nonthreatening differ by cultures and their particular history.

- Why do you think most Americans begin with the question, *"What do you do?"* (Culturally for most Americans, what one does is how one is known, as opposed to what family they are from.)

- Ask: In our demonstration, what made you uncomfortable about the topics?

- What might have been more appropriate topics for you (for a relative stranger) to ask?

- If we need to begin the interview with topics that people enjoy talking about and which neither pose a threat nor break an acceptable cultural level of intimacy, we need to identify those in this cultural context.

d. Use **appropriate, nonthreatening question forms**. Not all people are comfortable with questions calling for their personal opinions, such as *"What do you think about all the trash on the ground in this town?"* You might get a more satisfactory response from a question such as, *"What do people say about all the trash on the ground in this town?"*

- Does the form of the question make a difference to you?
- Does it depend on the topic?

e. Read **nonverbals**.

- In our demonstration, were there any nonverbals that the interviewer might have picked up?

- What examples of nonverbals have you experienced that gave you a clear message during a conversation or an interview? (Expressions of boredom, uncomfortableness with questions, etc.)

f. **Listen** more than you talk.

- How do you feel about silence?

- What can you do to keep from jumping in with another question when your interviewees may just need some time to think and answer?

B. Interview Questions and Notes

How do you remember what you want to ask, any key topics, leading sentences you want to remember, etc.? (What are problems with having and writing notes in an interview?)

One technique that we might use is a *topic outline* (See handout at the end of this session).

The *topic outline* is a sketch of the important information to be addressed in an interview episode (and supplanted throughout observations and structured activities). It is a nonintrusive tool that does not appear in the interview itself. The items on the outline are memorized. After the interview, return to the *topic outline* to make notes, review, and analyze the interview.

The use of the *topic outline* does not imply that the interview is strictly guided and any information outside of the outline should be ignored. Rather, it represents a minimum set of informational objectives to be achieved during the interview.

For practice, develop a *topic outline* for an interview with a group of your fellow participants. Consider information that would be useful if you were compiling research. You will have a chance to use the outline in the activity that follows.

C. Practice Interview

While we all know the proper way to interview, let's take a few minutes and work on some of the hard parts. It is always helpful to review the major pitfalls to avoid in interviewing, and by practicing with each other, we can learn new ideas for handling the difficulties.

Be yourselves in this practice. The interviewer will just be talking to you about your own work. The trainers will give one or more of you a slip of paper with a specific role to play. As the interview proceeds, please display the behavior you have been given. The idea is to have the interviewer deal with some of the dynamics that often happen in an interview situation.

Trainers' Note
The trainers can play the interviewer, but preferably the participants do it for practice. Selected members of the group can create a small focus group and role play the following interview problems (and how to work around them). Write the roles you want people to play on small slips of paper and hand them to members of the group. If you are tackling one problem at a time, give a few members of the group slips that say *just be yourself*. That way the interviewer will not know who has been given specific roles.

Practice can be done with several small groups at once, or in succession, each dealing with one or more of these problems:

- **The dominant alpha male problem:** one person dominating the conversation while others remain quiet.
- **The struggle to please problem:** the interviewee continually seeks the *right* answer (that is, the answer it is thought the interviewer wants).
- **The struggle to deceive problem:** the interviewee misleads the interviewer.
- **The decibel problem:** interviewer changes tone or pitch of voice in an interview.

Problems similar to those listed below, may be suggested by the participants:

- verbal answer does not match nonverbal behavior
- for some reason, the question is inappropriate, and no one answers

Summarize the interview component, emphasizing that the interview has to be driven by a genuine desire to understand and communicate; if not, verbal and nonverbal behavior will betray the facilitator.

Activity 3. Communication and Information-Gathering Skills: Observation

The importance of developing observation skills lies in the richness of the data that can be gathered nonintrusively.

What kinds of data might you get just by observing a particular setting?

During a visit to the field, one should systematically take note (at the time of the field visit or later) of the following kinds of information available through observation:

Observation Checklist	
1. Systematic: • Spatial organization of resources and infrastructure • Current forms of activity • Division of labor by gender & age	**2. Reality cross-checks:** • Information from interviews • Verbal and nonverbal agreement

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- Spatial organization of resources and infrastructure: where are the urban gardens, the green spaces, the water, the trash piles, the drainage ditches, the animals, the place of worship, the roads, the market place

- Current forms of activity: selling things, caring for children, gathering firewood, teaching, going to the market

- The division of labor by gender and age

Of equal importance is the ability to conduct reality cross-checks on data from interviews. In an urban setting, one can compare what one is told about a trash pile and what one actually observes by sitting near the trash pile and noting what goes on. The interactive nature of interview and observation data can corroborate information or can suggest further areas to be explored.

To develop systematic observation skills, the trainers can project a series of slides (without sound) or about 10 minutes of video—without any introductory orientation or previous knowledge. Participants then take 5 minutes to note their observations and 5 minutes to demonstrate how much has been learned just on the basis of detached observation.

Trainers' Notes
If a slide projector is not available, have participants imagine some sort of scene common to most participants.

Since most people will consider that they have these skills, consider adding a component to this activity which includes information from an interview, some of which is plausible but perhaps not predictable, on the basis of what is seen (e.g. not the obvious interpretation to what is seen), as well as some information that contradicts the visual.

Activity 4. Making the Leap from Interviewer and Observer to Facilitator

Trainers' Note
Facilitation skills are also addressed in *Session 5.*

To facilitate discussions requires the combined skills of interviewing and observing. Facilitation is a skill which encourages the members of a group to express and discuss their own ideas. The questions asked must elicit ideas, probe, and encourage everyone to participate and express views. It also requires paraphrasing and summarizing. It demands attention to the process of the group, including encouraging quiet and reticent people, while controlling dominant or disruptive participants.

This session should be modified and made culturally appropriate by working with language and cross-cultural trainers. For foreign development workers, the skills

should be introduced and practiced in English, if necessary, but also practiced in the host language as soon as possible.

1. Trainers explain that in this session there will be discussion and work on a very important skill: facilitation.

   - What does the word *facilitate* bring to your mind? List responses on a blank flip chart.

   - Being able to facilitate discussions will be an important skill for you to have as you begin to work with your community and colleagues.

2. Ask: What is the difference between a leader and a facilitator? Some possible responses are a leader introduces new ideas, leads participants through a series of steps, tests knowledge, and reviews activities. A facilitator, by contrast, helps a group process its own ideas, lets the knowledge reside in the group, manages the process not the content, and encourages all group members to participate.

3. Ask who has facilitated group discussions, and what were the situations?

   - When would you lead a group and when would you facilitate?

   - Explain: In PACA, both types of group management styles are used. The leader may direct the group through a series of steps to arrive at information, such as creating a map or a calendar. Then the role changes and a facilitation style is employed because the group has the knowledge; the facilitator helps them discuss it, make comparisons, and draw conclusions.

4. What are some facilitation techniques?

   - Question Asking: Review the types of questions that someone might ask (open, closed, leading) and discuss how a facilitator might use them in a group setting.

   - Paraphrasing: By paraphrasing what participants have said, facilitators demonstrate their understanding of what individuals think, and issues may be clarified for the whole group.

Phrases a facilitator may use include:

What I heard you say was....Is that correct?

I think you said that....Is that right?

You differ from (Mary) in that you think....Is that right?

- Summarizing: The purpose of summarizing is to
  a. pull important ideas, facts, or information together;
  b. establish a basis for further discussion or making a transition;
  c. review progress; or
  d. check for clarity or agreement.

Summarizing requires careful listening, organization, and systematic reporting back of information expressed. Summarized information ensures that everyone is clear about what transpired in that portion of the discussion. When possible, encourage someone in the group to do the summarizing.

Starter phrases for summarizing include:

If I understand, you feel this way about the situation...

There seem to be the following points of view about this...

We seem to have presented the following issues so far...

I think we agree on this decision...

- Closing the Activity

5. Ask how facilitating is different from interviewing? Some possible responses may be:

Facilitating	Interviewing
group	individuals
less directed questions	more specific questions
ideas represent group	ideas or opinions of one person

6. What are some benefits of group discussion when trying to understand other people's reality? What are some problems? For the facilitator? For the group?

7. Practice facilitating by looking at the key steps in facilitating a group:

   - Arrival of group (rapport building)
   - Introductions (demonstration of respect)
   - Facilitation of discussion
   - Summarizing
   - Closure

8. Trainers ask participants to divide into groups of approximately seven, consisting of five participants, one facilitator, and one observer. Ask the participants to identify the facilitator and the observer.

   - Give the facilitators a topic that the group can easily discuss, such as ways to improve the training site. Let the facilitator think through how to begin.

   - Ask the observers to use the key steps in facilitating a discussion to guide their observation of the group process, not the content.

   - Trainers let the groups begin and gives them about 10 minutes for their discussion and then closure.

   - Have observers join their group and comment on their observations. As a total group, discuss what went well and what did not. Ask: *What things were difficult for the facilitators? How can those things be addressed?*

   - Try to incorporate aspects of difficult group members into the facilitator's task. If necessary, repeat the exercise by specifically assigning roles to some participants to act quiet, dominant, or somehow dysfunctional.

9. Review the facilitation process, and bring the discussion to a close on positive aspects, things to work on, or lessons learned.

Activity 5. Introduction to Different PACA Techniques

Now, finally, let's look at the PACA techniques we are going to use. These techniques have been designed to maximize the participation of the local population and to build upon their indigenous knowledge and basic organizational skills. In general, these techniques involve much visualization and *hands-on* participation by local participants.

Participatory Analysis Techniques

mapping

scheduling

needs assessment (ranking)

- Mapping techniques (community, institutional, and resource), including neighborhood transects.

- Scheduling techniques (production activities, domestic chores, seasonal events, temporal changes in household income and expenditures, patterns of variation in health status, etc.) show monthly crop activity and diseases, food availability, labor demands and availability.

- Ranking techniques (ordering needs assessments, weighting)

We will be looking at each of these in more depth. It is important to remember that these techniques must be adapted to the problem at hand.

handout

Topic Outline For Community Field Work

A. The Household

1. Typical family
   - large or small
   - roles and responsibilities
   - composition of the family
   - education
   - distribution of family tasks: productive, reproductive, social
   - type of house (apartment, single-family, multiple-family)
   - housing stock (cement block, wood, tin, cardboard)

2. Resources available to the family
   - courtyard: large or small
   - urban fruit or vegetable gardens
   - other urban agricultural space
   - open space
   - communal or private water source
   - sources of water (well, stream, river)
   - latrine, shower, soak-away pit

3. Access to infrastructure
   - electricity, telephone, roads
   - institutions: schools, representatives of government, health center, local
   - industries, markets, stores
   - sports field

4. Small or large animals in an urban area
   - size of herd
   - location (penned in the courtyard, on land adjacent to the town, etc.)
   - animal feed (purchased, vegetable scraps)
   - available corrals, pens, coops, etc.

5. Credit
   - bank
   - informal
   - intermediaries
   - family

6. Economic activities
   - sources of income: government employment, nonformal sector, sales,
   - crafts
   - agricultural products from urban gardens to sell
   - animals to sell
   - remittances from family living elsewhere
   - salaried agricultural work

7. Decision making
   - who decides what
   - who is responsible for the income and expenses

B. The Community

1. School
2. Health center
3. Sources of water
4. Distribution/location of houses
5. Associations
6. Churches
7. Natural resources: deforestation, land
8. Transportation

C. Assets

1. Human
   - skills
   - organizations

2. Ecological
3. Material
4. Economic

PACA...Preparation for a Field Visit Session 7

Overview
The field application bridges the critical gap between training concepts and local community realities. At this point in the training, it is necessary to demonstrate how the PACA techniques are implemented in the field. The experience moves from designing participation to achieving participation.

Total Time: 45-75 minutes

Objectives
1. To demonstrate the effectiveness of the participatory approach in analyzing community constraints and opportunities.
2. To provide the participants the opportunity to practice their newly acquired skills.
3. To gain skills to integrate the local community into the training process.
4. To generate a valid PACA analysis of the community.

Resources
- All the materials needed for the PACA tool that will be used
- Camera for taking photos and/or slides, as desired
- Video camera and blank tapes, if appropriate
- Gift for community, if appropriate

Handouts
1. Profile of Each Community (trainer generated)
2. Team Tasks for Field Work, page 67
4. Tasks for Training Teams, (trainer generated)
5. Diagrams of Half Day Community Work Sequence , page 68 (optional)
6. Topic Outline for Community Field Work (previously prepared and discussed, pages 61-62)

Trainers' Notes

In this session trainers need to assess the costs and benefits of sending participants to conduct community engagement skills. An alternative to a host country community might be the community of participants, the community of support staff at the training center or the community of language professors. Trainers should communicate these training nuances to participants in order that they begin to understand the implications of this method. Participants should also understand that the skills they are learning and practicing become better over time. They should not eschew the opportunity to practice these skills in a safe and known environment.

The preparation for the field day is key to the success of the experience. The participants receive their preparation for practicing each PACA technique in a simulated environment prior to the field application. In a similar sense, the trainers must prepare the local communities for the field day. As a general rule, trainers should contact the community at least one month before the field experience in order to explain the purpose of the field day, elicit their *voluntary* and *willing* participation in the experience, explain the techniques and their procedural steps, and prepare the logistics of the field day.

When participants arrive at their site of assignment, they might use these specific hints to get started. (Trainers may find handouts generated from this information useful.)

1. Selection of the communities:
   - Community should be representative of the communities targeted by the nature of the work to be done (i.e., the community has a solid waste problem).
   - For manageability, the community should be relatively small; less than 300 households is ideal (though not all members of all households will participate in the exercises at once).
   - When more than one community is used, communities with differing characteristics should be selected in order to expand the application of the techniques.
   - Care must be given to select communities in which inhabitants are available (i.e., not occupied by peak season labor demands, feast-days, etc.).
2. Procedural details (to be explained to community contacts):
   - If two or more techniques are applied in a given community, a minimum number of available participants is required, but not everyone all day. If one technique is done in the morning and another in the afternoon, two groups of (maximum) 20-30 men and two groups of 20-30 women will be required—one group of each gender in the morning, then a second group of each gender in the afternoon.
   - It is necessary to consider the representativeness of the community participants in order not to exclude participation by criteria of ethnicity or socioeconomic status.
   - Two separate, independently equipped areas or meeting rooms are required.
   - At the end of each technique, men and women rejoin to interpret the results and give recommendations; this can be done in one of the two meeting areas or in a larger accommodation.

- If a lunch or dinner is planned, it must be scheduled to include both morning and afternoon groups. (Funds for a meal should be provided from the training event budget, unless this sets up an uncomfortable precedent, then alternative plans should be made.)

3. Other hints:
   - Select a community where the development worker has some contacts, is actively known or endorsed by local leaders, and has an ongoing relationship to community members.

   - Use the local informal leadership to prepare the community. Perhaps invite community representatives to the training prior to the field day.

   - Make sure dates and arrival times are clearly understood, and training participants are punctual.

   - Make a detailed explanation of the field day plan upon arrival.

   - Preselect the teams going to the different communities and/or who will work together within one community. This will ensure that there are people with community experience on each team, a balance of quieter and more assertive people, as well as a gender balance. If interpretation is needed, appropriate team members for this role must also be selected.

Procedures: (Trainers and participants are still at the training site)

1. Background information on the community (20+ minutes)

Describe in detail the communities that have been chosen, and the details that have gone into the preparation of the communities. (This can best be done by the person who made the community contact. A trainer-generated handout with data about each community is useful.)

2. Preparation for the visit (30 minutes)

Discuss what teams must complete at the end of the session to prepare for the community work. Distribute the Team Tasks for Field Work handout on page 67, and go over each point.

As a group, determine a list of things you can do while there is dead time in the community (e.g., if you have time before the opening session, a group may not be able to start meeting for a while, there is some time before or after lunch). This list might include walking through the neighborhood with a community member, having that person describe what they are seeing, visiting someone's latrine, etc.

Distribute the **Topic Outline for Community Field Work**, on pages 61-62. Explain the logistics, including times of departure and return, meal arrangements, suggested dress, etc. (These details may be presented in a handout.) Ask if there are any questions about any phase of their preparation, the logistics, etc. of the field work.

3. Team Preparation (30+ minutes)

Explain that teams are to meet and complete their preparation according to the **Team Tasks for Field Work** handout. Indicate where the supplies are located. Trainer will circulate to answer questions and help as needed.

When participants are totally prepared for the following day, or after individual assignments for preparation of materials have been made, they may be dismissed.

handout

Team Tasks for Field Work

Discuss exactly what your team will do during the field work. Discuss each item below, assigning names to roles. Do all of the tasks described. BE PREPARED TO BEGIN WHEN YOU ARRIVE IN THE COMMUNITY.

1. Which PACA techniques will be used?

2. Which participants will play the various roles during the visit. <u>All participants must have at least one specific training role.</u>

- Who will introduce the field day activities to the community?
- Who will introduce each activity to a group of men/women and take the lead in facilitating the activity? (This role must be taken four times. As many different participants as possible should take this role at one time or another.)
- How will the other participants on the team assist with each activity?
- Which participants will be observing interpersonal behavior between community members and between community members and participants?
- Who will facilitate the reunion and presentations, and the discussion between the men's and women's groups for each activity?
- Who will interpret? How will the interpretation take place, simultaneously or sequentially? If the interpreter is not a part of the workshop, who will be responsible for briefing her/him about each of the activities?
- Who will formally thank the community, including presentation of a gift, if appropriate?
- Who will video tape and/or take photographs, if appropriate?

3. Once roles are determined, discuss in detail how you will conduct each exercise: who will say and do what, how others will assist. Select and practice your ice breaker.

4. Determine which supplies are needed for each activity you will conduct, including ice breakers, name tags, etc. Decide who is responsible for collecting and taking them and making anything that must be prepared in advance. Check the list of materials provided for the items needed for the tool you will be conducting.

handout

Diagrams of Half Day Community Work Sequence

With Large Groups of Trainers and Small Number of Community Members

Division into Large Groups			
Community One		Community Two	
10 women 5 community mapping 5 needs assessment	10 men 5 community mapping 5 needs assessment	10 women 5 community mapping 5 needs assessment	10 men 5 community mapping 5 needs assessment

Schedule Within Communities				
Participants				**Activities**
Everyone: men and women together in one group				Welcome Introduction Explanation of purpose
Group of women		Group of men		Icebreaker Name tags Division into 2 groups: mapping & assessment
Women Map	Women Assessment	Men Map	Men Assessment	Applied participatory techniques
Men & Women with Maps		Men & Women Assessment		Mixed groups of same activity together to share and discuss ideas
Everyone: men and women together in one group				Each group presents their work, discussing what it means; what was valuable to them by doing this; closure.

PACA Tools...A Representative Daily Activity Schedule Session 8

Overview
At one level, the daily activity schedule technique is meant to identify the routine labor demands of men and women in their daily lives. This information provides valuable insights into both the labor constraints of each group as well as the areas for which labor-saving technologies might be readily adapted. At another level, this technique demonstrates the gender-biased perceptions of the work load of each group. In this sense, the technique helps to raise awareness with regard to the contribution that different groups make to overall household welfare.

Total Time: 60-90 minutes

Objectives
1. To learn how to develop representative daily activity schedules with community groups.
2. To use representative daily activity schedules as the basis for discussion of differing perceptions of daily workloads.
3. To use the schedules to identify labor constraints and opportunities for labor-saving technologies for men and for women.
4. Relate the results of this technique to the development of a community action plan that incorporates gender realities.

Resources
- Flip charts, markers, masking tape

Trainers' Notes
This session requires good interviewing skills and an awareness of the variation in *typical* work days. Where major differences exist from one season to another in terms of routine activities, the trainers must either explicitly identify the season or repeat the exercise using two routine days that represent this seasonal variation in activity level.

The daily activity schedule technique requires two groups—one representing the men in the community and another for the women—located in separate areas with their respective sets of session materials.

These groups must be chosen carefully and with attention to representativeness. If only the men of a dairy cooperative or the women with husbands who migrate to find work are selected, the routine activity schedule may not be representative of the this

community. Once the groups are formed, the facilitators explain that the purpose of this exercise is to trace a routine day from the time of rising to the time of retiring at the end of the day.

1: The Content of the Technique (15-30 minutes)

A. Ask the group to consider a routine day during the year (If there are great differences by season or work period - for example teachers, agricultural workers - they may need to repeat the exercise twice.) Then, beginning with the time that the day begins, the group is asked to reconstruct a normal day. The level of specificity should be determined by the nature of the activity: bathe or wash and eat breakfast, go to the market, wait in line for water, prepare dinner. These activities should be associated with rough estimates of the time block.

B. After each group has assembled its routine day, they are asked to reconstruct the typical day of their gender opposite, going through the same process as above. This may be difficult for some groups, but the discussion of what they think their gender opposites do is useful.

C. The typical *man-day* and *woman-day* are recorded on flip charts. Each group should select someone to explain their schedules to the others.

The two groups are then rejoined and each group reports their results. Then the assembled community is asked to interpret the differences in labor demand and perceptions of work loads using questions such as:

- What are the differences in labor demands? Their perceptions of work loads?
- What would reduce some of the work load? (Closer water sources, trash collection service, closer market)
- When would be the best times of days for meetings? Training?
- Other?

When participants are learning this technique, the trainers ask: *What experiences have you had with this technique?* If none, *what kinds of differences do you anticipate there will be between men and women's schedules?*

2: Modeling the Technique (45 minutes)

The training participants form four groups to model the technique. Two groups represent men and women. The other two groups represent the trainers and

demonstrate the daily activity schedule technique among the men's and women's groups.

The men and women may use any of the following as their scenario:

- one of the case studies already used in the training, as long as the typical day material was not shared;
- a community scenario they create or;
- their own lives as trainers, extension workers, etc. Using the final choice simplifies the preparation, but they still need some time as gender groups to share information so they have a solid base for doing the exercise.

After preparation, the trainers address the group as they might a community group, explaining what they are going to do, establishing the groups, and conducting the exercise as described above.

After the community debrief, ask the participants to change their seats and get out of their roles. Lead a discussion based on *Technique Debrief*.

Technique Debrief

Trainer preparation

Introduction of technique to neighborhood group

Getting started

Problem areas they encountered

Group sharing of their work

Discussion among men and women

Conclusion

Session 9 PACA Tools...Community Resource Mapping

Overview
Community resource mapping is an effective manner of locating different spheres of activity spatially over the landscape. At the same time, this technique can be adapted to reflect gender differences in the division of labor for solid waste management. Local populations consistently demonstrate the ability to create graphic representations of their spatial organization. Furthermore, this technique often provides a highly interactive and pleasant introduction to the community. This technique is more appropriate to neighborhoods where there is a clear correspondence between residence and community resources. Areas larger than 200 households are not easily accommodated by this technique.

Time: 90 minutes

Objectives
1. To identify the gender-differentiated appreciation of and interaction with SWM.
2. To compare gender-differentiated perceptions of the relative importance of different community services including municipal institutions, such as markets, schools, and health clinics.
3. To relate the results of this technique to activity programming and evaluation.

Resources
This activity can be designed in several ways each requiring different materials. Normally, the activity requires large sheets of paper, markers or crayons, a large table, some physical item that can represent differing degrees of intensity or importance (such as different sized circles cut from construction paper or small pieces of different colored paper). Two separate work spaces with the same materials are required. Local materials (seeds, drawing sticks, a patch of dirt, etc.) can also be used in the absence of purchased materials.

- Flip chart: *Technique Debrief*
- Two large sheets of paper, marking pens, masking tape
- Three sizes of colored circles, one set for each participant; or multiple small pieces of three different colored papers

Trainers' Notes
The community resource mapping technique requires significant skills on the part of the trainers. There is often either a tendency for the local participants to individualize the technique (i.e., to locate their house on the map) or for one participant to dominate both the marker and the activity. The trainers must work to assure representative participation and avoid widespread confusion. Thus a clear, unambiguous introduction to the

exercise and the location of the activity are critical to its success. Ideally, this activity should be carried out by a lead trainer and one or more assistants dispersed among the participants who can facilitate the passage of materials and the participation of different community members.

> **Special Note**
> In Mauritania, a mapping exercise was used with illiterate participants. The participants were able to draw on the ground, placing rocks and sticks to represent landmarks. The trainers then took the ground image and transferred it to paper.

Procedure

A. Introduction (15 minutes)

The mapping technique introduced here combines elements you will find in descriptions of participatory analysis. In addition to having maps drawn to show the community, this technique also has community members identify physical characteristics such as trash piles, water sources, markets, etc. and show the relative importance of things in their community.

This PACA technique can visually show significant gender differences in how members view their community, how they locate different activities spatially, and how they attribute importance to different sites such as trash depots, schools, water sources, clinics, markets, roads, municipal buildings, extension offices, and so forth. Once this activity has been done, it is very difficult to deny the differences between men's and women's views of the community.

The essential element of this activity is the identification of two community groups—one of men from jointly managed households and one of women from either jointly managed or female-headed households. Each group does the same activity in separate work spaces.

B. Step-by-step Description of the Content of the Technique (15 minutes)

1. Group selection: This technique involves the selection of a group of men and a group of women, both of which manage resources and have household responsibilities. Within each group, the selection of participants should reflect the different age groups and economic classes in the community.

2. In separate rooms or buildings, or on separate tables moved outside, the two groups seat themselves or stand around a table where a large sheet of newsprint and markers have been placed.

3. The groups are asked to draw the community, beginning with a reference point (market, road, dump). The drawing exercise ideally gives all participants

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a chance to contribute, although one *artist* might be appointed because of specific sketching skills.

The trainers seek not to direct this mapping but to explain clearly the categories of sites that are sought. It is more important to have a comprehensive range of potential resources and institutions and less important to adhere strictly to scale. The information commonly placed on the maps includes:

- residential areas
- urban agriculture, green spaces, irrigation ditches
- trash piles, water sources, stagnant water pools
- schools, places of worship, association centers
- markets, municipal buildings, extension offices, hospitals
- primary, secondary, and tertiary roads or walkways

4. Once the residence patterns, resources, infrastructure, and institutions have been spatially located, the different groups are asked to assign a level of importance to each site, based on how frequently they use or visit the site and then mark the map with a symbol.

Symbols can be colored circles cut in 3 sizes: the largest circles represent the most **important** (frequently visited, like a trash dump or a water source), the smallest, the least important. There also may be a symbol, such as the smallest circle, that represents a place people **do not want to be**. Alternatively, you may use many small pieces of three colors of paper. Each color represents **frequency** (i.e., green = daily, blue = weekly, red = monthly or less). Each participant uses as many of each color as they need.

For example, women might regularly visit the trash piles, while men frequent the cafés. This component of the technique is to determine the gender-differentiated networks that households form and maintain.

Throughout the mapping activity, the training team is encouraged to take notes on the decision-making and consensus-building process that takes place on the side. These observations are highly relevant to understanding underlying issues and estimating the variation of opinions among the participants.

5. Community Analysis of the Gender Differences: Once the maps have been completed, all participants are assembled and asked to analyze the differences between the two maps. In effect, the community provides its own interpretation of the results and the outputs, which should lead to insights with regard to eventual roles for community members in SWM. In this component of the technique, the facilitator asks each group to summarize their respective sessions then, selects a community participant to lead the discussion of the results.

6. After the participants work through a mapping exercise, the trainers should lead a discussion of how to organize a mapping exercise in a community as part of a PACA technique.

What elements of the exercise must be modified to meet the challenges of the community? (Some possible concerns might be the logistics of transporting supplies, not knowing if illiterate people might attend.)

What special concerns should the participants note for their future role as a facilitator of the mapping exercise? (Some possible concerns might be not taking too much control over the maps, feeling comfortable with the logistics of the exercise.)

C. Have participants conduct the community mapping technique with a small group of participants, such as site personnel in order to gain more practice with this technique.

Session 10 Needs Assessment and Community Assets

Overview
Gender-differentiated needs assessment and asset tools provide the means to identify principal constraints and to elicit opportunities for project intervention in SWM based on community strengths and weaknesses. This session will describe a technique, outline the content, and discuss the technique's relevance to community action planning. Then training participants will model the technique in preparation for an eventual field application.

Time: 90 minutes

Objectives
1. To introduce one method of conducting a needs assessment technique in a community setting.
2. To introduce methods for assessing community assets.
3. To practice the techniques.
4. To relate the needs assessment and community asset approach to the development of a SWM activity and community action plan that incorporates gender realities.

Resources when conducted in a neighborhood
- Two separate rooms for 20 to 30 people each
- Flip charts, markers, masking tape
- Items for voting or demonstrating preference
- Handout, Field Insights, Needs Assessment Tools, page 86
- Handout, Asset /Problem Approach to Development, page 87
- Handout, I Went on a Search, page 88
- Handout, Six Principles of the Asset Approach to Community Development, page 89

Additional Resources
For the *Assets Approach Section* please see the following documents:
- *Building Communities From the Inside Out*, by J.P. Kretzmann and J.L. McKnight.
- *Building on Assets in Community Development: A Guide to Working with Community Groups*, by K. Wilson, C.R. O'Donnell, and R.G. Tharp.
- *The Asset Approach to Community Development: A Training Module for Youth and Community Development Work in Urban and Rural Areas*, by B.D.F. Richmond.
- "Tonga Training Sessions" by J. Russell.

Trainers' Notes

This session relies heavily on the focus group interview, and the trainers must be especially sensitive to representativeness of the group response. Some form of group consensus or majority preference must be achieved, and a high level of facilitator direction may be required in order to insure the maximum participation. As with the PACA techniques, the trainers should be attentive to the human dynamics that underlie each group decision or voting episode in order to document intragroup variation and to understand the factors that drive the decisions.

The needs-assessment-by-rank-ordering technique is designed to stimulate a ranking evaluation of the constraints and opportunities by the members of the community. The technique assumes that gender differentiation may be significant and that men and women may not recognize each other's profiles of preferences.

Part 1. Introduction

A. The Needs-Assessment-By-Rank-Ordering Technique, a Detailed Description (30 minutes)

1. Introduce the technique to the group, emphasizing the importance of individual participation in the consensus-building that this technique requires. It is important that the needs assessment be representative of the group and not of any one individual in the group.

2. Each group states the areas they consider to be the biggest concern for a SWM activity in their household or in the community.

3. The facilitator notes these on the flip chart where all can see. (At this point there is often much discussion among the community participants with regard to the relevant constraints. This dialogue provides an excellent source of information and should not be discouraged.)

4. If participants list things not related to SWM, the facilitator must decide how to proceed. One of the pitfalls of asking what people's challenges are is getting answers that may or may not fall within the scope of work of a development worker assigned to that site. Sometimes, a facilitator can make two lists (or more) to classify the challenges and then say, *"Today we will talk about solid waste."* Sometimes a community will have clear ideas about their needs that **do not** correspond to the strengths of the development worker. When this happens a development worker can:

   - listen to the needs and seek assistance to respond to those needs
   - decide not to work with that particular community, or

- conduct further awareness raising sessions to encourage activities in a given sector.

5. Once the list is made, ask participants to further elaborate on each issue, as necessary. For example, there may be one or two items that seem to be the same. Have them clarified; if appropriate, combine into one issue. (See alternate notes at end of session.)

6. Once the list is made, the trainers ask the community members to vote on which concerns they consider to be the most serious.

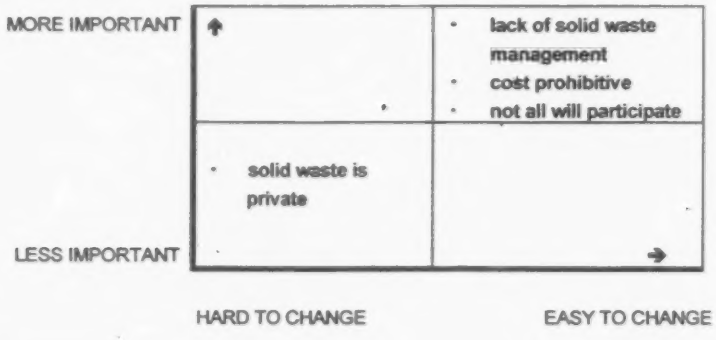
Voting may be done in any fashion that will generate a ranking. If there is a long list of constraints, this technique may be used to get to the top five. But, there is no set number of problems that limit the exercise. If there is concern that voting by show of hands will be influenced by certain persons, then people can vote by dropping markers in envelopes attached next to each item.

When participants have compiled a list that all are happy with, the trainers put up the *Easy-to-Change/Difficult-to-Change* Matrix. Then, starting with the top ranked item, participants decide first, if the problem is more or less important relative to the others and second, if the problem is easy or difficult to change.

Sample List Of Problems, in Order Of Priority

1. lack of solid waste management
2. cost prohibitive
3. not everyone will participate
4. solid waste is personal; not for public view

Sample *Easy-to-Change/Difficult-to-Change* Matrix



Participants would like to avoid trying to organize an activity around priorities that are less important and hard to change. Conversely, organizing activities around more important and easy to change priorities lend themselves to success. If

participants experience trouble in deciding how easy or difficult to change something is, have them imagine clear cut issues like what time to wake up in the morning (easy to change) and achieving global peace (difficult).

7. Finally both groups are brought together for a sharing of information and results. A representative selected from among each group provides a summary, and then a community member leads a discussion or interpretation of the differences between the two groups' lists.

8. If this is the first step toward community action, the facilitators/trainers attempts to mediate a consensus on a compromise plan of action for the entire community.

B. Practice Training in Needs Assessment and Ranking (45 minutes)

Trainers' Notes
For practice training purposes, have participants form four groups to model the needs assessment technique. Two groups represent the men and women of the community. The first group takes ten minutes to prepare a local case study scenario. The other two groups represent the trainers and conduct the needs assessment technique with the men's and women's groups.

1. The trainers ask the participants to assume they are a group of women (or men) living in the made-up situation. Making use of the situation (and any additional information you wish to add), the trainers ask the women and men to consider the problems or obstacles they think their community faces. The trainers tell the participants to call out their answers. The trainers note them on the flip chart where everyone can see. The men and women do not have to agree with everyone else's ideas; everything can be discussed.

2. Once the list is made, ask if anyone wants to say anything about the items. Let the group discuss as they wish. The discussion about the items is extremely useful, so give it all the time you can. As the facilitator, you may need to raise questions to clarify items listed, if they are unclear or several items seem closely related.

3. If the list is more than five items, allow the participants to vote on the two issues they think are most important. List the items in priority order. Continue with the *Easy-to-Change/Difficult-to-Change* Matrix.

4. When the participants are happy with their matrices, bring them together and hang up the lists. Have a reporter from each group explain the matrix. Ask the group to discuss both lists and matrices and come to a consensus on the integrated priorities for the community.

After the neighborhood debrief, ask the participants to change their seats and get out of their roles. Lead a discussion of the technique, including flipchart *Technique Debrief.*

Part 2: The Asset Approach to Community Development

A. Introduction

The asset approach to community development builds on the existing strengths of a community rather than focusing on its deficits. Every community has groups of people who come together for a productive purpose. The asset approach to development utilizes these existing activity settings to produce a product or products to enhance development. The process of working together and developing a sense of shared values and goals is just as important as the product produced. The bonds fostered in working together will strengthen the community and can be drawn upon in future development efforts.

Objectives: By the end of the session, participants will be able to:
1. Describe the difference between an *Asset Approach to Community Development* and a problem approach;
2. Identify familiar development efforts according to the respective approaches utilized.

Rationale
The *Asset Approach to Community Development* encourages Peace Corps Trainees to consider themselves as facilitators of community development, regardless of their job assignment. It shifts the focus of community entry and development from identifying *problems* and *deficiencies* to identifying *assets, resources, and current strengths* found in communities. Focusing on community member's strengths promotes self-esteem, while concentrating on their weaknesses tends to diminish the desire to participate. It allows the community developer to build upon current activity settings in communities.

Activities

1. Introduce the concept of the problem-based approach to development by breaking up the group into two or three smaller groups and passing out the first handout for them to read through and discuss. Each group is given the task of coming up with a list of different examples of the problem-based approach that they have witnessed or are familiar with. Then they develop a role play (less than 5 minutes) that describes one of these efforts. (30 minutes)

2. Small groups present their role plays to the large group. **Note:** Facilitator should take notes on these role plays. You will refer to this content during the *Force Field Analysis* exercise. (20 minutes)

3. The handout **Asset/Problem Approach to Development**, on page 87, is read aloud to the group. Participants discuss the pros and cons of each approach, listing them on a flip chart. (10 minutes)

B. Activity Settings

Trainers present the following quote to the participants:

"Community, as well as individual life, is organized around activity....To understand a particular community, observe and understand the patterns of current and desired activities....Community development begins by identifying the activity settings, and the means to coordinate the use of these resources to enhance or create activity settings."

—Wilson, O'Donnell, and Tharp

Trainers ask participants to define activity settings and note them on a flip chart.

Activities: Describe Card Sort Activity

1. Have the participants form small groups and discuss different examples of activity settings within their communities. (20 minutes) To aid them in this task, display the following questions:

What sorts of things do you do with others during the day?

What are the main activities that you do with your family?

Describe the activities that you do with your friends?

Classmates? Co-workers?

What do you most like to do in your free time?

Some examples are: playing soccer/football; singing in a church or school choir; girls braiding each other's hair; boys fishing on the pier; tending crops with the family.

2. Have each group draw pictures on a sheet of flip chart paper to represent their different activities. (15 minutes)

3. Have the small groups report back to the large group and explain their individual drawings. (20 minutes)

4. After the groups have explained their drawings, each small group will have the opportunity to ask specific questions about an activity setting that one of the other groups has presented. Have them pretend to be newspaper reporters who want to gather as much information about the activity as they possibly can, so that they may understand it completely.

On a flip chart, display the following informational categories that they might use.

Categories for Better Understanding of Activity Settings

- People involved (individuals or groups)
- Themes of concern/opportunity expressed by people in these settings
- Various viewpoints related to the purposes of the activity
- Historical context (as it relates to the present situation)
- Ecological/environmental factors related to the setting
- Process of decision-making (present and desired)

5. Give the groups time to select which activity setting they want to focus on and the questions they want to ask. (5 minutes)

6. Let the groups interview each other to obtain as much information as they can about the activity settings. (20 minutes)

7. Process the exercise with the participants. (10 minutes)
   - Which questions were the most helpful?
   - What information did you learn that was useful in understanding the activity settings?
   - When wanting to effectively communicate with community members, what should outsiders be aware of from a cultural perspective?
   - What other questions could people have asked you that would have helped them to learn more about your own particular activity setting?

C. Role of the Community Development Facilitator

Trainers introduce this part by asking participants to think about the differences in the role of the facilitator with problem-based assessments vs. assets assessments.

Activities

1. Trainers prepares newsprint charts with the six *Operative Principles*.

2. Post the charts and explain each principle in a *lecturette* format. Cite examples from personal experience, previous PC projects, other development efforts, and elicit examples from the participant's experience in the course of the discussion. (The intention is to impart the information concisely and accurately according to the authors of the article "Asset Approach to Community Development.")

Six Operative Principles

OPERATIVE PRINCIPLE I Participate Meaningfully and Cooperatively Enhance Neighborhood and Community Activity Settings **(Community Entry)**	**OPERATIVE PRINCIPLE 2** Examine Existing Community Assets
OPERATIVE PRINCIPLE 3 Design New or Enhance Existing Activity Settings By Aligning the Effort's Values, Beliefs, and Rules for Behavior with Those of the Host Culture	**OPERATIVE PRINCIPLE 4** Transform Activity Settings Having No Identified or Valued Product into Joint Activity
OPERATIVE PRINCIPLE 5 Proceed in Community Development by Engaging in Reciprocal Relationships of Assisting and Being Assisted	**OPERATIVE PRINCIPLE 6** The Nature of the Activity and How it is Done are Just as Important as the Products. Concentrate on Engaging in Quality Processes

3. Post the newsprint charts conspicuously around the training room for future reference and reinforcement of the principles.

4. Close this part by reading the handout, "I Went on a Search," from page 88.

D. Resource Bank

Objectives

By the end of the session, participants will be able to:

1. Identify what skills they individually have to offer;
2. Identify what skills they wish to develop in training;
3. Discuss how to adapt this session to a community setting.

Rationale

Many people have skills that they take for granted or do not realize they have. By becoming cognizant of each person's skills, the group then has a bank of resources at its disposal.

Activities

1. Divide the large group up into three or four smaller groups. Write the following categories on a flip chart or chalkboard: *survival skills; social skills; work skills; leisure skills*. Give some examples of these (i.e., prepar/ing food; knowing what to do in a traditional ceremony; preparing the ground for planting; knowing how to play football/soccer). Each group will compete against the others, as follows. (5 minutes)

2. Tell the teams that they have 10 minutes to come up with as many examples of the different skills as they possibly can. Then have the teams share their answers with the entire group. Lead applause for everyone's efforts. (20 minutes)

3. Give each person a sheet of paper and ask them to write down as many of their own skills that they can think of. After 10 minutes, have them pair up with someone else and share their list. Ask the entire group if there is anyone that came up with skills for themselves that they hadn't thought of before. (Have two or three people share their examples with the group.) (20 minutes)

4. Have all group members compose a letter to themselves in which they assess their own skills and identifies which skills they would like to develop, and how they will do so in the remaining time of PST. Explain that they should seal their letters in an envelope and address it to themselves. The letters will be mailed on or about (select a date). Letters will remain confidential. (15 minutes)

5. Trainers collect the letters and save them until the agreed upon date.

6. Trainers ask participants the following questions:
   - How might they adapt this session in a community setting?
   - What is the difference between assessing one's own skills and the skills of a group of people?
   - In a community setting, what would be the advantage to conducting separate skills assessments for women and men?
   - How would the role of the facilitator change in a community setting?

Optional addition

A table of the group's special skills can be created, published, and shared among the group for later reference of service.

E. Looking For a Balance

Trainers retrieve lists of problems identified in Activity 1 on the *Easy-to-Change-/Hard-to-Change* Axis and the lists of skills of the participants. With participants, cross-check to identify the potential for the skills of the participants to address the problems identified.

Trainers focus the participants on the resources they have within their own community to work out their own challenges.

Trainers close this session on an upbeat note.

Field Insights, Needs Assessment Tools

When needs assessment tools were practiced at the Gender and Development Training of Trainers Workshop* in Latin America, several suggestions were made for ensuring that a needs assessment tool is not an isolated, linear activity. Some of the suggestions included:

- Spend time walking around the community with local people (both women and men) talking about what you see, asking questions, getting a feel for the community.
- Begin working with groups using the community mapping activity. They provide a warm up and give context to problem areas.
- Express problems in different ways. A simple list may confuse problems with causes and effects. Some examples are:

    1. Using cards and a pocket chart, have participants draw pictures of problems, causes, and consequences. The pictures can be moved around in the pockets until sequences make sense. (Good for illiterate audiences.)

    2. Create problem trees with problems written or drawn on cards. Then causes and effects can also be drawn and placed in spatial relationship to the problem. Cards can be moved around as needed.

    3. Dramatize critical situations. Stop the action and discuss the problems and potential solutions.

    4. Ask each person to suggest a problem their own household faces. In sharing them, they realize others have the same problems.

- An alternative way to determine priorities is to divide into small groups to discuss the list of problems developed. In the small group develop consensus (not voting). Then combine small groups and repeat the process with more people. Finally have the entire group together, again reaching consensus.

* Taken from GAD Training of Trainers, June 11-17, 1995, Asuncion, Paraguay.

handout

Asset Approach to Development

"The asset approach to development emphasizes community-based planning in which community members associated with selected activity settings are involved in all phases of work...The asset approach advises development workers to look *at* activity settings rather than *for* problems."

Wilson, O'Donnell, and Tharp (1994)

The asset approach focuses on utilizing the resources that are present in a community and builds on those existing resources. Community members, who can best identify their own cultural parameters, create the most socially appropriate settings to make things happen!

"Every culture has assets that make it viable, or did make it viable in its traditional context. These assets are often different than those expected by European, American, or other outsiders, but they are assets nevertheless, and can be harnessed to a variety of goals, including economic and technological development. In the long run, the most effective way to develop programs is to identify the assets present in the culture, and use those assets to produce the wanted development."

Wilson, O'Donnell, and Tharp

Problem Approach to Development

Promoting community development from a *problem approach* is a matter of identifying the *problems* in a community and then *fixing* them.

Unfortunately, this all too often means that problems are *fixed* from an individual person's point of view - most often the development worker who comes from outside the community - and the *solution* does not necessarily provide the best *fit* given the cultural, economic or social customs of the community. This solution is similar to putting a square peg into a round hole (from an American perspective).

The essence of the problem approach - implying that some deficit exists and that community members are to blame for the negative conditions that exist - reinforces the notion that a community lacks the competence to improve its own situation.

"When a problem approach to community development is used, the direction and power in the relationship tends to shift to those who have the capabilities and resources in question, usually to things and people outside the neighborhood and community."

Wilson, O'Donnell, and Tharp

I Went on a Search

I went on a search to become a leader. I searched high and low. I spoke with authority, people listened. But at last there was one who was wiser than I, and they followed him.

I sought to inspire confidence, but the crowd responded, "*Why should we trust you?*" I postured and I assumed the look of leadership with a countenance that glowed with confidence and pride. But the crowd passed by and never noticed my air of elegance.

I ran ahead of the others pointing new ways to new heights. I demonstrated that I knew the route to greatness. And then I looked back and I was alone.

"*What shall I do?*" I queried. "*I've tried hard and used all that I know.*"

And then I listened to the voices around me. And I heard what the group was trying to accomplish. I rolled up my sleeves and joined in the work. As we worked I asked, "*Are we all together in what we want to do, and how we'll get the job done?*" And we thought together and we struggled towards our goal. I found myself encouraging the faint-hearted. I sought the ideas of those too shy to speak out. I taught those who knew little at all. I praised those who worked hard. When our task was completed, one of the group members turned to me and said, "*This would not have been done but for your leadership.*"

At first I said, "*I did not lead, I just worked with the rest.*" And then I understood—leadership isn't a goal. I lead best when I forget about myself as a leader and focus on my group, their needs and their goals. To lead is to serve, to give to achieve together.

Author Unknown, from Gold Nuggets: Readings for Experiential Education, edited by Jim Schoel and Mike Stratton.

handout

Six Principles
of the Asset Approach to Community Development

as taken from Wilson, O'Donnell, and Tharp.

1. Participate in and cooperatively enhance community activity settings. (community entry skills)

2. Examine existing community assets (see sample chart of a community assets map in *Building Communities from the Inside Out*, by Kretzmann and McKnight)

3. Design or enhance existing activity settings consistent with values, beliefs, and rules of host culture.

4. Encourage joint activity; practice inclusion; practice collaboration.

5. Engage in reciprocal relationships of assisting and being assisted; turn spectators into participants; learn from leaders; turn over leadership roles.

6. Engage in quality process; "How it is done is as important as what is done."

Session 11 PACA Tools... Debriefing Field Work

Overview
The field day debriefing consolidates the field experience, allows the participants to analyze the information and apply it to programming and project identification goals. At this point in the training the participants integrate actual field experience into the Topic Outline or other data collection tools. This session may end the training in analysis and tools, or be a stepping stone to other ones. Or, it may set the stage for learning how to move from PA (Participatory Analysis) to CA (Community Action).

Time: 5 hours

Objectives
1. Team members share the information gained from working in the same community as a means of describing the overall family/community system and gender differences within it.
2. Analyze the gender differences that emerged from each technique (and other sources of information) in order to define the important role of gender in family/community change and development.
3. Evaluate the participatory effectiveness of the techniques.
4. Apply the results toward next steps in generating community action.

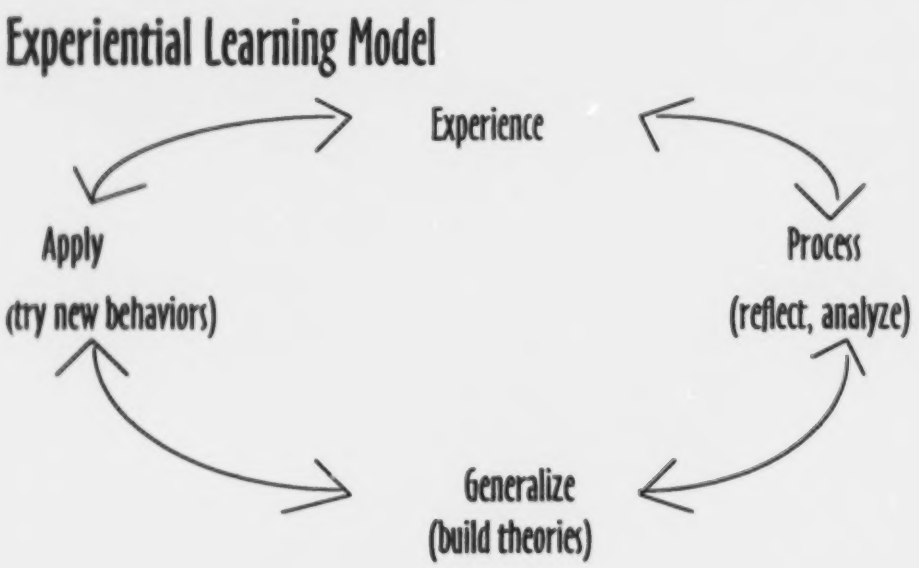
Resources
- Flip charts, markers, masking tape
- Visual aids prepared in each community
- VCR and tapes made in each community, if any
- **Topic Outline**, distributed prior to field work
- Other information collection tools
- Handout, **Debriefing Task 1 - Description of Community**, page 94
- Handout, **Debriefing Task 2 - Analysis of Gender Difference in the Community**, page 95
- Handout, **Debriefing Task 3 - Evaluation of the Techniques/Field Day**, page 96

Trainers' Notes
The trainers facilitate the processing of a large quantity of information. As such, they must be particularly observant during the field experience not only to incorporate the content information derived from the techniques, but also to include the human dynamics and interactions between the various training participants and between the training participants and the community members. The nature of these dynamics should be discussed in the debriefing session.

Also, the trainers should be sensitive to the allocation of time. The tendency is to over invest in the descriptive part of the session and to under invest in the analysis and applications components. Likewise, if one or more participants had difficulties carrying out their techniques, they may be quite frustrated. If possible, move through the descriptive phase before talking about the frustrations. That will allow them to see how much information was actually transmitted, even if they were not satisfied for whatever reason. However, if frustration is very high, begin by de-briefing the experience, and then move to what was learned.

A. Description and Sharing (2 hours)

Introduce the process we will use to debrief our experiences in the field by explaining the experiential learning model:



Experience is something personally encountered, undergone or lived through. In this case, the field experience the participants just had.

Process is reviewing or recalling what happened. Who did what, in what order, and with what effect? Examine your reactions and observations about what happened. Identify patterns and dynamics and alternative behaviors that might produce different effects. In the example of the field work, it includes pulling together all of the data and discussing what happened in the community.

Generalization is given the analysis of what happened, what theories emerge? What new ideas, learning, or understandings do you have? What new principals or concepts emerge for you? Once the group has looked at all of the data and

observations, what concepts or ideas emerge about personal and community resources, tasks and labor demands, hungry times and times of financial needs? What gender differences did the group find? What opportunities and constraints begin to emerge?

Application asks how can one use this information in the future to do work more effectively? What additional skills do development workers need to use their new-found knowledge? How can the development workers and the community develop a partnership for problem identification, resource analysis, decision-making, and planning that will lead to changes and development wanted in the community? Or, as a programmer, how can this information speak to project directions, including redesign, site selection, monitoring and design?

This component of the debriefing allows an hour long small groups discussion, followed by each team making 20-minute presentations of their findings to the whole group.

- Distribute handout Debriefing Task 1, on page 94. Allow time for reading, and then answer questions.

    - Once the groups start working, monitor for time. Give them a 10 minute warning before the reporting begins.

    - All the visual materials prepared during the field experience should be displayed around the room.

    - After all reports are done, conduct a brief questions and answer session or discuss what has been presented.

B. Reactions to the Participatory Analysis (20 minutes)

Discuss participants' general reactions to using the techniques. What worked well? What was difficult? What would they want to do differently the next time?

C. Analysis of the Results (2 hours)

This segment calls for an analysis and an interpretation of the gender differences in the information. In this step, they are to try and imagine that they are the people in the community they visited. They will divide themselves into two groups, one group representing the women of the community, the other representing the men.

Spending approximately 30 minutes working as gender groups, they will identify gender differences in their community, including constraints and opportunities as they can imagine them.

- Distribute the handout Debriefing Task 2, on page 95, and answer any questions.

D. Evaluation of the Techniques/Field Day (30-45 minutes)

The evaluation of the technique and information gained can either be done by the total group or by the smaller community groups.

Three sources of information are available to evaluate the usefulness of each technique in particular and the field day experience in general:

1. The quality of the information from the technique itself.

2. Observations on the dynamics of the technique application.

3. Information from general observations and informal interviews outside the technique itself. See handout Debriefing Task 3, from page 96.

Each of the two community teams meet separately for 20 minutes of preparation for their evaluation. Then they have 10 minutes to present their evaluation to the entire group.

After both reports, discuss the recommendations and come to consensus, as necessary.

handout

Debrief Task 1 - Description of Community

You have an hour to discuss and note all the information you gained in your community. Use the Topic Outline handout and the visuals you brought back from your community.

1. **Begin with the Topic Outline.** Ask one person to keep notes for everyone. Discuss each topic and note what you learned. Information may have been learned through the general community meetings, talking one-to-one with people in the community, or from the techniques you used. Don't forget to list the Community Assets.

2. What information came out of each activity/technique? (The group's recorder adds any additional information to the Topic Outline.) Show each other the flip charts done in each exercise, share the information that came up in the discussions after the techniques by the men and women, look for your own interpretations, including gender differences, and **summarize the information**.

3. What **dynamics** did the observer notice about
   the community players,
   the training participants, and
   dynamics between community members and training participants,
   dynamics between other outsiders, such as extension agents, and the community
   addressing the assets in the community

4. What other information was gained about the community? By what means? Summarize it.

5. **Prepare to report to the entire group.** You will have 20 minutes to make your report. Present an overall summary of the community. Highlight what was learned from the techniques.

handout

Debrief Task 2
Analysis of Gender Difference in the Community

Divide into two groups: one group representing the men of the community, the other group the women.

1. Discuss and list the data by gender gathered in each category of the exploratory factors.

2. Discuss what the community said about the gender differences, constraints, and opportunities.

3. Summarize your analysis of the gender differences, constraints, and opportunities.

4. Be prepared to represent your gender group's realities in the next exercise.

handout

Debriefing Task 3
Evaluation of the Techniques/Field Day

Discuss and summarize:

Source of Information

- The quality of the information from the technique itself.
- Observations on the dynamics of the technique application.
- Information from general observations and informal interviews outside the technique itself.

Evaluation Criteria

- Efficiency
- Effectiveness
- Intensity of participation
- Recommendations for improvements

Summary of Section Five

By the time you complete these activities you should be able to formulate a description of your community. Pay particular attention to:

- What kind and how much solid waste is generated per day in your community.
- Who is responsible at the household level, the neighborhood level, the city level, for disposing of the trash?
- Regardless of who is supposed to be responsible, what actually happens to the solid waste at each level?
- Are there special gender considerations for the disposal of the solid waste?
- How do community members feel about what happens to their solid waste?
- Of all possible activities the community is interested in pursuing, where does solid waste management rank?
- Of all possible activities, which ones do you, the development worker, think you can do something about?

Are you ready? Read on!

Section Six Implementing CBSWM

It's time to get to some specific technical sessions and information about community-based solid waste management. A trainer or development worker can select the most appropriate order for the sessions or even use some of the sessions to increase the knowledge of community members about the benefits of improved solid waste management. These sessions can be used to point out deficiencies in a current system for solid waste management as well as to encourage thought towards opportunities for using solid waste as a resource.

Before proceeding, trainers must be assured that participants have adequate background information on a community and solid waste management conditions. Check back to the summary of *Section Five* on the previous page. Trainers should have participants think about those questions and try to formulate an image in their minds about the existing conditions in a community.

Overview

- *Sessions 12-16* provide the framework for assessing the solid waste management situation and collecting information.
- *Sessions 17-18* use the knowledge gained to make decisions and get a SWM plan moving.
- *Sessions 19-26* provide training in specific tools for community members to use to provide their own environmentally sound solid waste management system.

The Role of Legislation, Regulation, and Enforcement in Solid Waste Management — Session 12

Overview
The role that the existence or absence of legislation and regulation play in solid waste management is fundamental to working with and improving the existing system. Laws and regulations are meaningless without enforcement, however.

Time: 2-3 hours

Objectives: Participants will
1. Gain knowledge of existing legislation and regulation about solid waste management.
2. Begin to assess if laws and regulations are enforced and by whom or which organization in the country or community.
3. Explore the historical perspective of solid waste management regulations in their country.
4. Explore the concepts of voluntary compliance, incentives, and other non-regulatory means to encourage people to participate in a solid waste management program.

Resources
- Flip charts, markers, masking tape
- Documents (legal or other) which describe environmental legislation, regulations, and enforcement procedures.
- If possible, request a speaker who is a representative of a government or other organization charged with enforcement of solid waste regulations.
- A crossing-cultures resource person to talk about the historical perspective of legislation and behavior change in that country.

Trainers' Notes
This lecture and discussion session can be enhanced by speakers, if available. If no speakers or legal documents are available, trainers will need to investigate these things in advance and be prepared to serve as the *expert* on the topic.

Frequently environmental regulations and codes can be found in health and hygiene documents as opposed to environmental law documents. In Francophone countries a document called a *Code d'Hygiène* may have environmental regulations. In Spanish, look for *Reglamentos Sobre el Saneamiento.*

Enforcement of solid waste management regulations is often lacking although officials may be willing to improve enforcement if they had a clearer idea of their role and the community's attitude. A development worker in the Philippines

suggested inviting an enforcement official to meetings and workshops to increase participants' knowledge and confidence in working with enforcement issues.

Questions for Discussion:

1. What is the importance and value of legislation and regulation?

2. What is the value of legislation and regulation without enforcement?

3. Who or which organization is responsible for enforcement of environmental regulations? How effective is that group at enforcing the regulations?

4. What is the difference between national and local level regulations? Enforcement?

5. Can participants give some examples of local level regulation they have seen (i.e.,signs spray-painted onto walls saying, "No Urinating, Fine $xxx amount," signs posted at trash piles saying, "No dumping").

6. If regulations exist and you can find copies of the texts, discuss the purpose of the regulations. Are there
   - nuisance laws (laws to protect against annoyances such as removing trash because it is unsightly)?
   - environmental health laws (laws designed to prevent negative health of citizens)?
   - safety laws (laws designed to prevent accidents)?
   - What is the difference, anyway?

7. Discuss other ways to get people to adopt or embrace a new behavior without legislation or regulation.

8. Some examples include voluntary compliance (follow the regulation or else something bad will happen), peer pressure, personal incentive to gain something desirable, education, etc.

9. With the crossing-cultures specialist, discuss the historical perspective on the solid waste issue. How was solid waste managed in a rural setting? How and why is it different in an urban setting? Why have things changed?

10. Ask participants to describe how they would like to encourage people to change a behavior. What sorts of activities would need to take place?

Overview
Understanding the structure of a government is the first step in learning to work with it. Linking community groups with municipal officials is essential for creating partnerships, opening communications, and establishing modes of behavior that can lead to long-term sustainable action.

Time: 1 hour, plus field trips

Objectives: Participants will
1. Begin to understand the structure of the municipal government, how the government is elected or appointed, the responsibilities of the officials, the length of their stay in office and other aspects of governance logistics. Note any recent developments or structural changes in the government such as a decentralization policy, newly created multi-party elections, and the impact.
2. Gain knowledge about its service delivery capabilities (human, mechanical, vehicular, financial), revenue-generating capabilities, and expenditure patterns.
3. Gain knowledge of attitudes of municipal officials towards citizens and service delivery.
4. Begin to investigate opportunities for collaboration between local communities and the municipal government.

Resources
- Flip chart, markers, masking tape
- Speakers from the municipal government's office
- Suggest a field trip to the headquarters of the government and the technical services department to view the fleet of vehicles, observe the staff, and gain a sense of the conditions under which municipal government employees work.
- Participants should prepare in advance a list of questions to ask and observations to make based on this session's objectives.

Trainers' Notes

Participants must have adequate language capabilities to benefit from this field trip and the information the speakers provide. Trainers should request in advance that the meeting take place at the offices of the municipal government. Trainers should brief the speaker(s) on the topics to be covered and the language abilities of the participants if necessary, and organize a site visit to the municipal government and technical offices.

1. Trainers should try to organize a visit to the municipal offices that include a talk by the mayor, if possible, or the mayor's designee.

2. In the debriefing session, discuss what people heard or gained from the session.

Trainers' Note
Postpone the full debrief until after *Session 16: A Day with the Trash Truck.*

Understanding the Importance of Civil Society Session 14

Overview
Regardless of the strengths or weaknesses of municipal governments, the ability of citizens to mobilize to address their own needs with the support and concurrence of the local government is essential to founding community-based solid waste systems.

Time: 1-2 hours

Objectives
Discuss with participants the necessary linkages between communities, community groups, community leaders, and municipal officials.

Resources
- Flip chart, markers, masking tape

Trainers' Notes
In some countries the notion of a civil society not only exists, but its merits and roles are discussed and debated. In other countries the concept of a civil society emerges slowly as information filters in from other places. Depending on the level of development of civil society in a given country, trainers should modify the tone of this session to best meet the needs of the participants.

Trainers discuss with participants the definition of civil society and, on a continuum of civil society friendly-to-unfriendly, emerging-to-well-developed, discuss an action plan to most effectively encourage both community-based activities and government support.

Civil society is a term used to describe community actions and activities taken to address needs unmet by another source. Usually civil society emerges in response to a lack of services by the government. Care for orphans, the sick, the elderly, the poor; provision of services such as tutoring for illiterate people, technical skills sharing, working with urban youth; or the creation of organizations to provide technical services such as solid waste removal, gray water evacuation, latrine construction are services frequently provided by community-based organizations.

When community groups attempt to fill in the gaps and provide a needed service sometimes government officials become uneasy. They fear that the community, by their action, is exposing a weakness, fomenting dissatisfaction, or mocking the government. Community groups can and should avoid antagonizing governments by

by working all along with officials to inform and seek assistance where and when appropriate. Government officials can become allies in the effort to bring needed services and resources to the community level.

Community-based solid waste management services require constant contact and coordination with municipal government officials. At some point in the SW process community-based services will likely need the assistance of the mayor's office to continue with the trash evacuation process, to borrow some of the heavy machinery, or secure the necessary approvals for a community-based group to begin operating a solid waste removal service.

To neglect municipal officials because of perceived weaknesses will doom the project to failure. Likewise, should the municipal staff undertake an activity in the community, without the assistance and cooperation of the community, the activity will also fail. Development workers need to assess the level of acceptance of community-based activities on the part of the municipal officials and proceed accordingly.

Where the concept of community-based service provision and a civil society has yet to emerge, attention to relationships among community members and leaders and municipal officials must be cultivated carefully. The goal of a functional civil society-government relationship is to provide collaborative assistance to meet the needs of citizens.

Trainers discuss with the participants the evolution of civil society in their community and the position of the government towards community-based activities. Discuss, if participants are sufficiently prepared, the best strategy for working with their municipal officials on a community-based solid waste management project.

If Municipal Officials Are:	
Civil Society Friendly	**Civil Society Skeptical**
they: use normal channels of communication	they: develop channels of communication
propose ideas	work to define a common understanding of the problems faced by citizens
secure approval	develop joint ideas of how the community can assist to address those problems, define how the government can assist in the process
implement projects	propose ideas, develop strategies, secure approval, implement projects, but allow sufficient time for communication channels to develop between the community group and the municipal officials

Further Explorations of the Sociology of Trash Session 15

Overview
More intensive study of the product-to-trash-to-solid waste stream. Participants will focus on what the trash is, who handles it, and at what stage (household, intermediary dump, final dump), including *hidden* handlers. Looking for evidence of recycled and reused products will be discussed.

Time: 1-2 hours, plus site visits

Objectives: Participants will:
1. Learn about the social aspects of trash and solid waste.
2. Gain knowledge about potentially unseen users of waste products in order to recognize groups or classes of individuals who may inadvertently be excluded from a solid waste management program. Women frequently pre-recycle objects prior to curbing trash. If an *improved* system were introduced, would the women lose this opportunity?
3. Observe what products can be and are being recycled and reused and by whom.

Resources
- Flip charts, markers, masking tape
- Sites to visit: market, bus station, poor neighborhood, wealthy neighborhood, site of urban food gardens, site of urban animal raising (chickens, pigs, etc.), slaughter house, municipal dump, other sites
- Town maps from previous sessions

Trainers' Notes
Participants will break into groups and visit several sites in a town. Following the site visits they return to the training center and discuss what they saw and learned.

A. Site Visits

Prior to departing on the site visit: discuss what *sociology of trash* might mean. Why is it important to know who handles trash and at what stage? What are people's attitudes towards trash? Are there overt or subtle class differences or prejudices towards people who handle trash? Is trash being formally or informally recycled? How can you tell?

Participants break into groups of two to four and visit and observe one of the locations listed above. Have them bring prepared questions and a list of things to observe.

Here are a few *THINK* questions:

1. At your observation site, what are you observing, who is participating in what was going on?

2. Is anyone earning a living from any activity associated with trash/solid waste?

3. What critical things have to happen in order for this dynamic to continue as is? If things get changed, what will happen?

B. Waste Stream Discussion

Regroup and discuss what was observed. Trace a waste stream by-product, if possible (i.e., what happens to fruit/vegetable scraps from the time they are produced until they are deposited at the dump).

1. Discuss different stream configurations for different products.

2. Discuss gender/class differences for handling of products.

3. Discuss differences or similarities among sites/neighborhoods businesses for waste products and people working with the waste.

4. Given the observations and learnings, can the participants identify who would stand to lose what if something in the waste stream changed?

5. When discussing an improved solid waste management system, what special considerations must be respected?

6. Are there any existing formal or informal recycling or reuse strategies that could be enhanced or expanded?

Assessing Current Versus Desired Service Session 16

Overview
Some municipalities have some level of solid waste management. Knowing what the level is, which areas receive/do not receive service, how frequent if serviced, etc. is essential to making recommendations for improving and/or implementing a new plan. Acknowledging that different areas of the town are likely to get different levels of service is also important. Finally, a development worker working with community members to determine their desired type of service will increase the chances of success.

Time: 1-2 hours or 1 hour one day and 2-3 hours another day

Objectives: Participants will
1. Gain knowledge about current solid waste management service levels in different parts of the town.
2. Begin to explore what sort of service citizens would like to have.

Resources
- Markers, flip charts, masking tape
- Town maps from previous sessions

Trainers' Notes
One of the most effective ways to assess current levels of service is to go to the consumers of the service. Using PACA methodology participants can meet with groups of citizens in female/male groups to conduct a focus group interview on current vs. desired levels of service.

Another way to get at the same information is to conduct individual interviews with citizens and officials.

Caution must be used with this activity because, as with other PACA activities, engaging a real community creates expectations. If participants are not training at their site, alternative choices for simulated community interaction must be sought. Language trainers, training center support staff (cooks, laundry personnel) may provide an acceptable alternative to intervening in a community. A school community may provide an acceptable alternative; participants can likely interact within the school community and be able to follow through in a manner that will not create unfulfilled expectations.

Activity 1: Preparing for the Interview/Focus Group

1. Participants working in small groups of two or three divide the town, perhaps according to the trash site they previously observed.

2. Each participant team develops an outline or questionnaire in advance of conducting the activity to determine what is the existing level of solid waste service and what is the desired level of service.

3. Working with the methodology of conducting a focus group interview or an individual interview, the members of the participant team structure how the focus group or interview will be conducted.

4. If individual interviews will be used, team members decide how to select interviewees (random, by household, etc.).

5. If focus group interviews will take place, the participants work through how to set up, with the community, an appropriate time and place for the focus group.

Activity 2: Conducting the Interview/Focus Group

1. Participants go to their survey sites and conduct either the focus group interview or the individual questionnaire.

2. Participants return to the training site to process their findings.

Activity 3: Process the Interview/Focus Group

1. As a group, discuss what people told you.

2. Note findings on the town map regarding existing service levels and desired service levels.

3. On a separate flip chart, note the actual vs. desired service levels.

4. Begin to brainstorm about how to move from actual to desired service. Think and talk about how to move this session from the immediate classroom to the intended community. What remains the same? What changes? Who brainstorms?

5. Note conclusions and save them for later group work in *Sessions 22 and 23*.

A Day with the Trash Truck Session 17

Overview
The reality of working with the municipal government, its equipment, staff, and philosophy may be different from the image portrayed by the municipal staff in the previous meeting, or it may be the same.

If the town in which this training is taking place does not have a trash truck, participants may accompany the vehicle or the people who collect MSW (Municipal Solid Waste).

Time: Half day accompanying the trash truck, plus 1-2 hours

Objective
Participants will ride on a trash truck and view first hand how trash is collected and disposed of.

Resources
- Arrange with the municipality for trainees to accompany trash haulers on regular circuits
- Flip chart, markers, masking tape

Trainers' Notes

1. This activity needs to be organized in advance. Permission and approval needs to be sought from the head of the technical services as well as from the trash truck crew.

2. The crew ought to be briefed on what the participants are going to do and why they want to go with the truck.

3. If the community in which this activity will take place has cultural restrictions on mixing males and females, appropriate logistics and preparation needs to take place for both the men and the women. Even if the culture permits men and women to be together in a public place, participants should go in pairs.

4. Depending on the size of the group of participants, more than one day may be needed to give everyone the experience. This will also help gain a broader perspective of the many uses of the trash truck.

type of shoes and protective clothing to wear. Discuss any sort of topic outline or common questions the group would like to use while on this trip. Here are some suggestions:

1. What route did the truck follow? Did it follow the same route every day?

2. Did it pick up trash pails? Did the workers manually shovel or pitch-fork the trash?

3. Are there intermediary dump stations (official or unofficial)? If yes, locate them on the map.

4. If the truck didn't pick up trash, what did it do? How did it get its orders to do what it did?

5. Besides picking up trash, what else did the truck do?

Send folks off with proper clothing and questions/observations lists.

Activity 2: Processing the Day
When everyone has had the experience of riding with the trash truck get the group together to discuss their findings and observations.

1. Compare and contrast what the municipal official said about the trash truck and service delivery with what the participants observed on their outing. Note down the similarities and differences.

2. Talk about what actually happened on the ride (Get out the town maps. Review answers to the questions your formulated during Activity 1.):

   - Looking at the flip chart with the actual service delivery versus the desired delivery and the municipal official's description of what happens vs. what participants observed, discuss options for an improved solid waste management system. Don't let yourself be limited by the constraints, think about what you would need to have happen in order to move from the actual to the desired scenario.

Summary of Sessions 12-17

By now, participants have gathered much information about the state of solid waste management in their community. They should understand the quantities produced, the content of the waste stream, the product to waste process including who handles the waste and when, which waste products have potential for re-use and recycling, who does the re-use and recycling, the realities of legislation, regulation and enforcement, the current system of solid waste management and the capabilities of the municipal government.

All of this knowledge helps participants get ready to select options for improving service delivery. The ideal method for gathering this knowledge is to use a participative methodology in which community members actually gather the information, process it, and sense their own options. For training purposes, actual interactions in the communities might not be possible, so the information gathered might be different from what community members would have gathered. The important thing is to work with

- the process of gathering the information;
- learning how to get information;
- what to get information on; and
- how to use the information to work with communities to improve their environmental health conditions.

The basic items that a development worker and community members need before proceeding include

- site-enhanced town/community maps,
- priorities for actions, and
- ideas for getting problems solved.

Session 18 Collection, Transportation, and Storage: Understanding the Options for Community-Based SWM

Overview
Based on the priorities of the community and the possibility of other existing solid waste management services, a community has several options of how to proceed with a SWM Plan.

Time: several days

Objectives: Participants will:
1. Work through the *Selecting a SWM Program* Matrix.
2. Brainstorm additional options to the **Selecting a SWM Plan** handout.
3. Have adequate knowledge to work with communities when the time comes and have thought through possible choices for SWM and understand key issues in developing a plan.

Resources
- Text, **The Role of the Community Member in Collection and Transportation of Municipal Solid Waste**, on page 116
- **Selecting a Solid Waste Management Program** Matrix **Benefits and Constraints to Various Waste Storage Methods**
- Flip chart, markers, masking tape
- Town maps for reference and illustration

Trainers' Notes
This session is very long and will take time and energy to implement. Many of the decisions to be made about a community's choice for its solid waste management system start here. These decisions can be made in stages and no decision is ever final.

Activity 1:

Trainers' Notes
At this point a community needs to decide on three essential items that will shape their solid waste management program.

1. What will be the role of community members in solid waste collection?

2. What are the transportation issues associated with the methods under consideration?

3. What are the organizational and logistical issues associated with the final storage of solid waste?

This session involves asking and answering many logistical questions, assessing tastes and preferences, and gauging the willingness of individuals to modify their behavior. While the questions can be asked in a few hours, it may easily take months of community work to achieve consensus, make decisions, and see results.

The text and diagrams will assist development workers and community members in asking the *right* questions to respond to collection, transportation, and storage issues.

1. Community-Level Collection and Transportation of Solid Waste

Trainers present and discuss the text on page 116: **The Role of the Community Member in Collection and Transportation of Municipal Solid Waste.**

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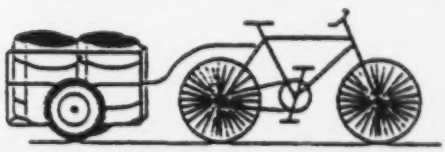
2. Transportation of Municipal Solid Waste

How the trash collection service transports solid waste is an important question. Depending on the resources in the community or of the trash collectors, decisions must be made on how the trash collectors will transport solid wastes. The most labor intensive/-least cost method is using human powered push carts to remove trash from the household area. The cost and complexity of possibilities moves up from a human powered push cart. The bicycle-turned-hauler* shown here is one such alternative.



High cost/low labor	↑	Trash truck
		Dump truck
		Tractor with trailer
		Motor bike-powered carts
		Animal-powered carts
		Bicycle-powered carts
Low cost/high labor	↓	Human-powered push or pull carts

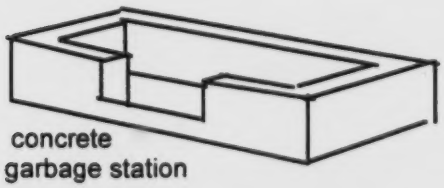
* From Non-governmental Refuse Collection in Low-Income Urban Areas, Roger Pfammatter and Roger Schertenleib, pg. 9.

A community must assess its needs and resources in addition to its preferences and then make a decision. See *Session 21, Part 6 and Part 11* for a discussion of the feasibility and choice of different options.

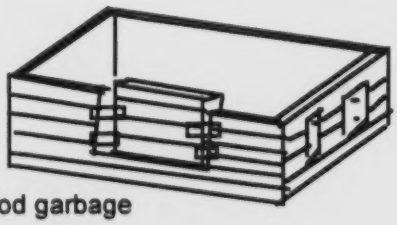
3. Spatial Issues of Storing Solid Waste

Internal to the community, whether linking with an external service provider or creating their own, the spatial question involves analysis of the role of the householders in the collection process. Imagine a straight line from the household to the final depot site for solid waste; this represents the simplest system. Households take wastes directly to the depot. When households are unwilling or unable to do this, the system, by necessity, becomes more complex. The addition of a trash collection service and/or transfer stations increases the number of steps on the way to the final depot. A transfer station is a place where solid waste is deposited for a short time period until collected by another service. *Session 24* discusses siting issues such as where to locate a transfer station and a final depot.

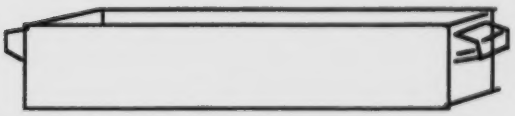
Storing solid waste at the household and transfer stations is also an important question that communities need to discuss. Households have a variety of containers available including metal or plastic trash cans, baskets, boxes, or bags (biodegradable?!?). The least desirable method would be to dump solid waste on the curb for the trash collectors to sweep/rake into their vehicles. The householders and trash collectors need to negotiate a mutually acceptable system.



concrete
garbage station



wood garbage
station



metal solid waste sleigh

Storage of solid waste at a transfer station is also an issue for communities to discuss. Transfer stations are intended as short-term storage facilities—they are not small sanitary landfills. The idea behind a transfer station is that someone or something will come by and pick up solid waste from the transfer station on a regular basis. The U. S. EPA, in publication 442, provides that "*collection frequency shall be determined so as to ensure public health and safety and to minimize collection costs and fuel consumption.*" Local conditions will dictate a desired frequency of collection. If the wastes will not be removed on a regular basis then this method of transfer stations is not only not recommended, communities should

also be prevented from constructing them. Various models of transfer stations are possible, including some of the images on the previous page.

Benefits and Constraints to Various Waste Storage Methods

Type of Storage Container	Benefit	Constraint
concrete station	relatively low cost	front loader will likely damage structure
	locally available materials	trash creeps out from back to front of structure often spilling into street
	localizes solid waste	when it is not emptied it becomes a health hazard
	anyone can reach to dump trash	trash collectors must rake, shovel or pitch fork waste into another receptacle
wooden station	relatively low cost where wood is plentiful	can be constructed bottomless and light enough to be moved
	localizes solid waste	when the door is left opened trash creeps
		if walls are too high children cannot easily dump trash
metal sleigh	localizes solid waste	sometimes walls too high for children to dump trash
	cuts down on manual labor	more costly to purchase or construct than cement or wood
	moveable to meet demands of users, spreads out NIMBY* phenomenon	relies on municipal/private service to maintain schedule for removal and replacement

Summary

Communities have come to a point where they have decided on a collection system, who will transport MSW, where the MSW will be stored, and in what type of receptacle. The next step is action on these decisions.

* Not in My Backyard

handout

The Role of the Community Member in Collection and Transportation of Municipal Solid Waste

As part of a solid waste management strategy, communities identify preferred collection, transportation, and storage methods. A community can and should be involved in deciding which management methods it prefers to use. The identification of management methods is a process.

A community begins the process by assessing its current level of collection service. If they have no collection service at all or irregular or unacceptable collection service, they can either decide to try to get service, improve service or take no action.

If they decide to pursue the service option they should investigate possible resources such as an existing collection service (municipal or private) in a neighboring community. The community may request that this collection service to be extended to provide comprehensive coverage in their neighborhood.

Alternatively, if the existing service lacks sufficient resources to extend the system, a community can request to link up with this collection service and benefit from the use of its machinery or its system. Collection from the household to an intermediary site is called *Primary Collection*, whereas collection from the intermediary site to the final site is called *Secondary Collection*. In order for primary collection and secondary collection to be effective, the systems must work in tandem so that the intermediary depots do not become dump sites. Frequently the intermediary depots are located close to residential areas or along accessible routes for the secondary collection system to collect.

The community might organize a primary collection system, unique to that community, that would bring its waste to a designated intermediary deposit point. The existing secondary collection service would then pick up the trash using its collection methods.

If there is no possibility to link up with another collection service, a community can still create their own solid waste collection service. The community collection method may be identical to the primary/secondary collection idea, or a community may take over the entire collection-transportation-storage process. A community needs to decide, internally, how its members will participate in the solid waste service.

Within the community, the household is very important. What household members are willing to do is crucial to the success of the system. Will the household members walk their solid waste to the designated points? Or, would they prefer a house-to-house collection service? Research conducted in Nouakchott, Mauritania, indicates that household members resist walking further than 50 meters (52 yards) to dispose of their solid waste. That means that intermediary depot points should not be located farther than 50 meters from the households.

If households cannot or will not walk their MSW to a designated point, then a trash collection service might be created to take the solid waste from the household level to the designated point. A trash collection service might also take solid waste to its final depot point within the community if an external service is not able to pick it up.

How the collection system is organized and the different options available are addressed in *session 21*.

Working with Community Members to Develop an Action Plan Session 19

Overview
This session (adapted from Booth 1996) teaches participants how to work with other people such as counterparts, local organizations, and/or other community leaders to develop an *Action Plan* and *Timeline* for their activities.

Time: 1 hour 45 minutes

Objectives
Explain how to develop an action plan and timeline with counterparts and community members.

Resources
- 3 handouts, First, Second and Third Action Plans, pages 119-121. Distribute these handouts to the participants before the session. Ask them to read them and to note down comments and questions they would like to discuss.
- Flip chart, markers

Trainers' Notes
The Peace Corps' Nonformal Education Manual has good sessions on creating *PERT* (Program Evaluation and Review Technique) charts, which are another way to link activities with actions and deadlines.

Activity 1: Introduction to Developing an Action Plan and Timeline

Trainers explains that developing an action plan is the link between the step of discussing and deciding what to do on an issue and what the community will actually do during the action phase.

Activity 2: Demonstration of How to Develop an Action Plan and Timeline

Demonstrate how to develop an action plan and timeline by facilitating a group session with the participants in which they determine an action plan and timeline for the rest of the training.

The complexity of the action plan and timeline will depend on whether counterparts and/or community members are literate. In any case, keep it simple, practical, and feasible. Start with something small and easily manageable. Then build on the successes.

Participants already learned how to assist community members in defining their priorities. The action plan takes those priorities one step further and defines exactly what will be done, by whom and by what date. To develop your action plan and timeline, help community members discuss and decide each of the following.

1. **What needs to be done and by when?**
2. **What resources do we need to do it?**
3. **Who will be responsible for carrying out each activity?**

List each activity in order of priority. Use the chart below to help organize your decisions. Review the action plan each week to monitor progress and make adjustments.

Action Plan

Activity 1 Resource Needs Responsible Person

_____

Date _____

Activity 2 Resource Needs Responsible Person

_____

Date _____

Creating a Timeline

The second part of an action plan is the timeline. It provides a succinct picture of the action plan. Begin the timeline at the start of the project or activity. Then make a line to indicate where the activity starts and ends. Lines that end with a vertical bar indicate where the activity starts and ends. Lines with arrows indicate an on-going activity.

Here are some examples of timelines for solid waste management activities. If the characteristics in the community lend themselves to these timelines then use them. If not, create an appropriate one.

handout

First Action Plan

For Communities with no SWM System at all and no Access to Service from Another Community

Activity **Months**

	1	2	3	4	5	6	7	8	9	10	11	12
Develop map of community showing current solid waste dump spots												
Assess community resources and preferences												
Community decides on the type of service they prefer based on options matrix												
Community develops *awareness raising* plans to educate members												
Environmental health logistics of SWM fees for services												
Community identifies individuals to implement a SWM program												
Community discusses plan with, or informs authorities of plan												
Community trains SWM workers												
Community monitors SWM program												

handout

Second Action Plan

For Communities with Access to Service from a Municipality or Private Group

Activity **Month**

	1	2	3	4	5	6	7	8	9	10	11	12
Community assesses resources and priorities												
Community formulates a proposal to present to the SWM service provider to extend service to their area												
Community assesses the acceptability of the response												
If community accepts the response, conducts education sessions in the community												
If community rejects the response in favor of their own plan (no action or action) they proceed according to: Action plan for communities with no service or linking up to service												

Third Action Plan

For Communities Desiring to Link up with Service from Another Provider Using Their Own Community-Based System

Activity **Month**

	1	2	3	4	5	6	7	8	9	10	11	12
Develop map of the community showing current solid waste dump spots												
Assess community resources and preferences												
Community decides on type of service they prefer, based on options matrix												
Community and service provider in another locality discuss possibilities for linking												
Community develops plans for raising member awareness												
Environmental health logistics of SWM fees for services												
Community identifies who will implement SWM program												
Community discusses plan with, or informs necessary authorities of plan												
Community trains SWM workers to conduct SWM activities												
Community monitors SWM program												

Working out a timeline during a training program may be much easier than working out a timeline in a community. Stick with it and with the community.

Session 20 Environmental Education and Information Dissemination

Overview
Even with community participation in the decision-making and action process, environmental education and information dissemination are key aspects of getting information out to all community members.

Time: 2 hours

Objectives: Participants will
1. Gain knowledge of the importance and use of environmental education and information dissemination techniques.
2. Brainstorm about possible information dissemination techniques appropriate to their communities.

Resources
- Flip charts, markets
- Examples of educational materials such as posters, videos, radio announcements.
- Case Study - Siquijor Solid Waste Management Program, page 124

Trainers' Notes
In Promoting Powerful People, by Elizabeth Mills Booth, techniques for locally recording and using radio spots are discussed on pp. 195-214.

Activities:
1. Trainers presents the Siquijor case study from the Philippines, page 125.

2. Trainers ask the participants to discuss the case study to identify some of the environmental education and information dissemination aspects.

   Some questions to include:

   - What are some of the educational techniques used in the case study?
   - What was the target audience? Why were those people targeted and not others?
   - What are some of the information dissemination techniques used?

- What are the strengths and weaknesses of those techniques?
- In light of the questions raised in the last paragraph, what can you suggest to increase the likelihood of long-term success of the SWM program?
- Would the use of mass media (radio, television) be appropriate?
- How is this case study similar to or different from the situation in your community?

3. Trainers organize participants into groups and ask them to design an environmental education and information dissemination campaign to address issues they feel will arise in their communities.

Case Study

Siquijor Solid Waste Management Program

adapted from materials provided by Isabelle Bully-Omictin

One development worker's strategy to both educate and disseminate information was to compile a slide show of dump sites (both official and unofficial) in her area. She presented the slide show at a regional forum to which mayors, municipal planning officials, NGO representatives, Barangay (the local neighborhood) officials, heads of offices (Department of Health, Environment, Police) and others were invited. The slide show was revealing and spurred the invitees on to action. During the first year, the development worker showed the slide program at the beginning of most of the workshops and seminars she organized.

Some of the issues brought to light at the initial information-gathering forum included the improper location of existing municipal dump sites; the inadequate maintenance of those sites and the increasing amount of biodegradable materials being deposited there; the non-enforcement of the ordinances mandating the construction of household compost, hazard, and burning pits; and the general lack of awareness on the part of the Siquijor population as to the importance of minimizing the use of plastics and the negative effects of disposing those plastic materials though burning.

In the Municipality of Larena, the newly created solid waste management committee (SWMC) decided to organize a "clean and green Barangay contest" to raise consciousness about solid waste management issues. A seminar was organized for neighborhood captains (leaders) to learn about the contest and general solid waste management principles.

The SWMCs are still in their infancy. The planning stage has gone well and resulted in promises of cooperation and funding from all agencies and sectors. It remains to be seen as to whether or not the population will be responsive to the education campaign proposed by the SWMCs. Children in the schools are taught from the first grade onwards about proper solid waste management. Many schools have built compost pits and most segregate their waste in the classrooms. Rules about indiscriminate throwing of garbage in the school yard are enforced. As of the writing of this document, those rules and regulations are forgotten once those children leave the school grounds and are therefore not passed on to their parents or other adults. It will be a major challenge for those persons implementing the information campaign to bridge that gap.

Trash Collection as an Income-Generating Activity Session 21

Overview
The service of collecting trash can provide income to individuals provided the service is run as a business on a fee-for-service basis. A workshop entitled ***"The Business of Waste"*** was held in Issia, Côte d'Ivoire, February 1995. This 12-part session is based on that successful workshop. Imagine that you are attending a workshop for budding entrepreneurs. Parts 2-12 will be presented to you as if you were the entrepreneur so that you will gain experience with the ideas, the forms, and the vocabulary. They also have the *Time, Objectives, and Resources* listed for your convenience. (Parts of the workshop sessions reproduced below have been slightly modified from the original to better suit this manual's objectives.)

Time: Half an hour if using **Part I** only; up to 40 hours for complete session

Objectives
Depending on the sessions, participants will gain knowledge, either cursory or in-depth, of how to sell trash collection as a profitable business.

Resources
- Handouts, as listed at the beginning of each of the 12 Parts
- Flip charts, markers
- If your community has a Junior Achievement office, it may be able to provide trainers, guest speakers, and educational materials.

Trainers' Notes
Part 1 can be used alone to inform participant development workers and community members about the income-generating possibilities of trash collection. The long version, all 12 parts, can be used to train future entrepreneurs to make a thriving business out of solid waste management.

Part 1: Introduction to Solid Waste

Overview: To situate solid waste in a worldwide context
Time: 30 minutes
Resources: Text, The Business of Solid Waste, pages 127-131, which participants should read in advance.

1. Once a community decides to investigate the possibility of creating a solid waste management business, a natural question surfaces: who is interested in taking advantage of this opportunity?

Discuss the possibility that existing groups might be interested in the work: youth groups, groups of business people, etc. Unemployment among young people is a common problem in towns. The opportunities created by a new business in solid waste management are exciting.

Participants read, then discuss the following text.

text

The Business of Solid Waste

A Workshop on the Management of Solid Waste and Business Skills

by Dr. Peter L. Doan, Department of Urban and Regional Planning, Florida State University

Held for Peace Corps and Junior Achievement - Issia, Côte d'Ivoire, Février 20-24, 1995

Introduction to the Solid Waste Problem

In 1994, in conjunction with an evaluation of a USAID-funded Urban development Project (MDSP and MMTP), I had the opportunity to visit a number of secondary cities in Côte d'Ivoire, Burkina Faso, and Mali. One of the common themes that surfaced in each of these cities was the preoccupation with the problem of garbage collection. The elected mayors and municipal councilors with whom I spoke all expressed their concerns about the need to find some way to deal with their mounting trash problem.

Africa did not invent the problem of garbage; it is a classic urban issue. In the Middle East it is relatively easy to spot the locations of ancient cities. Mesopotamia, the cradle of urban civilization, is dotted with large free-standing hills known as tells. These are the remains of ancient cities that never resolved their garbage problems. Archaeologists who have excavated these hills tell us that as trash accumulated over the years, the city dwellers simply built additional stories to literally keep their heads above the garbage (Niemczewski 1977, p. 11). Thus cities throughout history have struggled with how to collect and to dispose of the refuse generated by their populations.

Solid Waste Problems in Africa

Why has the garbage problem surfaced at this time with such apparent intensity and in such diverse countries? In large part this is due to the fact that the volume of garbage produced is growing larger each year. Engineers who study solid waste issues typically use models based on the average amount of solid waste produced per person per day to estimate the total volume which must be collected. Thus the rapid increase in population in secondary cities is largely responsible for the increase in the production of garbage by at least 7% per year. In addition to this "natural rate of increase," there are also changes in the nature of the garbage itself, which are related to changes in consumption patterns. For example, since consumers now use many plastic bags and other plastic packaging, these plastics have entered the waste stream creating a whole new category of waste.

However, there are several other factors which help to explain the confluence of interest in this sector. At the international level there is a greater interest in the subject of democratic reforms. These international concerns are mirrored by na-

tional efforts to decentralize government functions from the central to the local level. In many countries fiscal stress has forced governments to increase municipal responsibility for basic service provision, although this change is rarely accompanied by an increase in financial assistance to pay for the services. Finally because of democratization process, local officials increasingly recognize that if they wish to be re-elected, they need to be more responsive to the people who voted for them.

While in most African secondary cities there are a great many needs in the area of basic infrastructure and services, garbage is one of the most visible problems with relatively modest capital investment requirements. However, establishing an effective garbage collection system does require an investment of time and a substantial portion of a city's operating budget. These costs may range from 10-40% of the city's operating budget and of these 90% is for the collection and transportation of wastes (Cointreau 1984, p. 151). The exact amount required is a direct function of the amount of participation and the type of technology used to haul the waste at each of several stages in the waste collection process.

Organization of the Collection Process

Typically the solid waste collection process involves the following stages:

1. storage at the source
2. discharge to a collection point
3. storage at the collection point
4. transfer to final disposal site

In every solid waste collection system the participation of the population is required to store wastes in some location within the household until it can be collected. In some countries (China for example) mass education programs have been used to convince people that each household should participate by emptying its own trash directly into the trash collection vehicles (Oluwande 1984). However in most other countries solid waste workers are responsible for collecting the trash at the household level and moving it to a local collection point. This collection process can involve vastly different levels of transportation technology, ranging from human-powered wheel-barrows and hand carts to animal-powered donkey carts to motorized tractors and expensive trash collection vehicles. The number of intermediate collection points is largely a function of the level of technology in use and the density of the population.

It is useful to note that there are large variations in the number of workers required to provide trash collection services in a given city. In relatively poor countries a city may require as many as 10-50 workers for every 10,000 people. In Middle-income

countries where labor is substituted for capital there may be a ratio of 5-30 workers per 10,000 people, while in more developed countries like the United States there are typically 5 workers per 10,000 people (Cointreau 1984, p. 174).

Organization of the Service Delivery Process

While solid waste collection is a traditional area of concern for municipalities because of the public health dangers of poor collection practices, it is a public service which is often provided at least in part by private sector enterprises. There are four main forms of service provision, ranging from complete municipal involvement and control to complete private sector operations. In the middle are the two most commonly used arrangements.

1. Public provision - This option usually involves a municipal requirement that all households participate in the service, municipal workers to collect the trash at the household level, and municipal vehicles to transport it to a final destination. For example, in a system like this all pre-collectors would be working directly for the municipality and they would not be responsible for collecting fees.

2. Contract - The contract system involves a contract between a private business and the municipality, in which the municipality pays the firm to perform specific collection and transportation services. In general in these situations the municipality is responsible for recovering the costs of this service either by collecting solid waste fees directly from the households or by taking the money from the municipal tax revenues. In such systems there is no need for marketing of the service because the municipality usually passes a regulation requiring all household and commercial solid waste to be collected in a specified fashion. For example, in this system the pre-collectors would be an independent business paid under a contract by the municipality for the collection and transportation of the trash, but not for marketing or fee collection

3. Franchise - A franchise usually involves the granting of an exclusive spatial monopoly to a private firm for the collection and transportation of solid waste. (In some cases the franchise may not be exclusive, but permit other firms to compete for waste collection business within a given area.) Under the franchise system the firm is expected to collect fees for its service directly from the household and the municipal role is limited to ensuring that an adequate level of service is provided. For example, under this system the pre-collectors would be an independent business recognized by the municipality and granted an exclusive franchise for the collection of trash in certain neighborhoods. As in the contract system, the pre-collectors

would not have to do marketing of the service, but they would have to collect their own fees.

4. Private provision - Completely private provision involves one or more businesses contracting to provide services directly with individual households from all across the city. Because in this case not all households are required to participate, this system can be quite expensive if the households under contract are widely separated. For example, the existing pre-collection system in the Côte d'Ivoire is a modification of the private provision option. Unfortunately, there are some inefficiencies in the current system because not all households are required to participate. In addition the service is provided by essentially informal and unregulated pre-collection groups working in each neighborhood. Each group must do its own marketing and collect its own fees, but there is no municipal sanction for households that do not participate. At the same time if the pre-collectors do not do good work, the households have no ability to appeal to higher authorities for assistance.

The above examples of the solid waste collection process and the service delivery mechanisms are simply intended to simply layout a range of alternatives for illustrative purposes from a completely public system to a completely private sector operation. There is no single right or wrong alternative or combination of alternatives; however each has advantages and disadvantages which must be carefully weighed as choices about the most appropriate form of organization are considered.

Trainers' Note: If this text is used as an introduction to a specialized workshop, then include the following paragraph. If not, trainers move on to discuss essential points from the article focusing on different business systems.

Introduction to the Workshop

During the coming week this workshop will focus on different aspects of the pre-collection system as it operates as a business.

- We will first study the importance of entrepreneurship in any business undertaking.

- We will then examine different types of organization in principle and used in actuality by different pre-collection groups.

- Next we will analyze the nature of the system which produces this service and explore alternative means of generating income.

- Finally we will concentrate on basic management skills including appropriate accounting procedures and improved budgeting on an annual basis.

We anticipate that these topics will be a means for each group of pre-collectors to improve their own operations and prepare them to take advantage of opportunities for future growth.

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Trainers' Notes

Parts 2-12 are intended as sessions for entrepreneurs interested in creating a solid waste management business. When these sessions are presented to the group of development workers, trainers should make a point of stating who the intended audience really is. Trainers can modify the sessions to reflect a *Training of Trainers* format (in which the development workers being trained will return to their sites and train entrepreneurs), or they can present the sessions as they are written and the participants will take on the roles of would-be entrepreneurs.

Part 2: Entrepreneurship Test and Answers

Time: 20 minutes

Resources

- **Are You an Entrepreneur?** questionnaire, on page 133 (with answers on page 134).

Participants respond to questionnaire.

Afterwards, when answers are discussed, trainers explain that the answers to the test highlight traits found most often in entrepreneurs. A single entrepreneur does not necessarily have to have all of the characteristics.

Discuss which entrepreneurial characteristic is the most important. (There are no single correct answers.)

Are You an Entrepreneur?

Select the answers that best describes you.

1) I prefer to work
   a) with other people in a regular and predictable schedule
   b) on my own using my own skills and knowledge
   c) in a situation where my supervisor gives me instructions and I carry them out
   d) in an exciting and fast-paced environment where my colleagues and I all work towards the same goals

2) As a general rule the goals that motivate me are
   a) things that I talk about with friends and family that we decide to accomplish together
   b) things that are easy to achieve, I don't like to try to attempt things that are difficult or take a lot of work
   c) goals that I set for myself based on ideas that I have and things that I believe I can accomplish with hard work and perseverance
   d) things I know I can accomplish, but if I don't, it doesn't matter because I can always adjust my goals lower

3) The reason I most like to achieve the goals I set is
   a) the feeling of accomplishing things
   b) power
   c) money
   d) thanks from other people

4) When I set goals for myself I am also aware
   a) that I need other people to help me achieve those goals
   b) that I might not achieve them if other circumstances prevent it
   c) of a personal responsibility for the success or failure of that goal
   d) of an interest in seeing that idea come to fruition

5) When I perceive a risk is involved in an activity I feel
   a) scared and nervous
   b) challenged and excited
   c) indifferent and bored
   d) interested and curious

6) In general I think that most things
   a) I try I succeed at
   b) when I do fail I learn from my mistakes
   c) I calculate risk very accurately
   d) all of the above

7) Profits in a business are
   a) good for evaluating the performance of the business
   b) a means to assess the weaknesses and strengths of a business
   c) the only reason to engage in business
   d) good while they last

8) The thing I like best about being in business is
   a) working with my staff members
   b) making sure the day to day operation runs smoothly
   c) thinking of ideas and starting new things
   d) thinking about expanding it

See How You Scored

1. Entrepreneurs are often characterized as being independent and self-sufficient individuals. They need to be their own boss because they don't like to conform to fixed procedures or systems (and have an aversion to a hierarchical structure). They also have a great desire to achieve self-fulfillment, that is, to challenge themselves constantly and to overcome obstacles, shake up routine, and to achieve goals through their own efforts. That's why they must confront the challenge alone. But, they recognizes the value of help. They will likely choose people who are useful, whether friend or unknown experts. **The best response is (b).**

2. An entrepreneur has a lot of energy and is capable of working under stress for relatively long periods of time. Good physical health is necessary to have the energy to run your own business.

Entrepreneurs have the tendency to work towards goals they set for themselves rather than goals set for them by other people. This attitude leads entrepreneurs to compete against themselves and to surpass their own performance. To fight against oneself is more challenging than competing against other people. **The best answer is therefore (c).**

3. People who are motivated by a need for attention, for gratitude, for control over other people are also motivated by power. These people are more active in politics or in big companies, however. In contrast, an entrepreneur is motivated by a need to actualize rather than a need for power. Power and gratitude may be a result of success, but they do not make up the prime motivations for an entrepreneur. **The best response is (a).**

4. An entrepreneur has a lot of self-confidence. They believe firmly in their own capabilities and ability to achieve objectives and goals. They believe also that their own actions in daily life dictate success or lack of success. They do not hesitant to put themselves in situations where they are personally responsible for success or failure. **The best response is (c).**

5. Entrepreneurs are capable of determining inherent risk in a project when they believe their chances for success are high. Accepting risk is a fundamental dimension of entrepreneurship. Furthermore, entrepreneurs will choose a project where chances of success are one in three if they believe in their own abilities and experience. **An entrepreneur would be more likely to choose (b),** in order to confront a problem. They would avoid situations where the results depend on chance or efforts of others.

6. Entrepreneurs are positive beings and optimistic about their chances of success relative to failure. They prefer moderate or calculated risks or risks in which the chances of success are not too slim or too big. They are also aware that failure might befall them but that it will serve as a lesson. **The best response is (d).**

7. An entrepreneur is more motivated by achievement than by money, prestige, or power. They see profits as a means to evaluate performance and the achievement of objectives. Profits are also used to evaluate the general state of the business, to discover the strengths and weaknesses. An entrepreneur sees profits as a source of capital that permits the expansion of the enterprise. **Responses (a) and (b) are the best.**

8. Making good decisions, producing goods or a service of good quality at a good price are key elements of success of an enterprise and are the primary preoccupations of people in business. Entrepreneurs sometime run into difficulty when their enterprise grows—because they are not interested in management. They prefer working with creating and beginning new things. **The best response is (c).**

Part 3: The Fundamentals of Entrepreneurship

Time: 60 minutes
Resources:
- Flip charts, markers
- Handout, The Fundamentals of Entrepreneurship, page 136

1. Trainers ask participants "*How does one become an entrepreneur?*"

Answers such as those below show an understanding of what has been covered.

- establish goals
- like to take risks
- believe in oneself
- always want to do better

2. Trainers present handout.

The Fundamentals of Entrepreneurship

- Have an idea gained from observation, communication (TV, radio, other people, travel, etc.), other people's experience, from wherever
- Site study
- Set goals to be achieved
- Formulate a team to carry out the goal(s)
- Elaborate a business plan or a project plan
- Get the proper license or authorization
- Raise the necessary capital
- Get started!

Part 4: Improving an Organization

Overview: Participants gain knowledge about the different types of organizations and, if participants are already in an income-generating group, what kind of group structure they are in.
Time: 60 minutes
Resources:
- Flip charts, markers
- Handout, **Different Types of Organizations**, page 138

1. Trainers present handout. After reading, trainers lead group in discussion based on the following ***Think*** questions:

- How and when did you form your group? Specify any financial, material, or other contributions.
- If you have a business now (typically it would be trash or market vendors) what do you do? How large is it?
- How does your business/group function now? (Describe a week's activities)
    - Are the group's tasks clearly defined among the members?
    - Do all members understand and accept their responsibility in the group?
    - How are decisions made? Who makes them?
    - What do you do about lazy or impolite members? dynamic and motivated members?
- What type of organization must you have? Private enterprise, company, capital company, cooperative, club? Why?
- What would you like the group to become after this workshop?

Different Types of Organizations

- **Individual Enterprise:** a company owned and managed by a single person. The individual sustains the benefits and the losses.

- **Company or Enterprise:** an organization of two or more people combining their resources to share the benefits and losses. Each member brings something (money, materials, building, etc.) to constitute the capital of a company or enterprise. Enterprises are not always an officially registered organization with the state or municipality, while companies undergo a legal process of legitimization similar to incorporating.

- **Public company:** an enterprise made up of capital brought in by sale of shares or stocks. In countries with active and legitimate stock markets a company may go public, then anyone may become a shareholder by purchasing any number of outstanding shares. Decisions are made by a board of directors (usually composed of those owning the most shares).

- **Cooperative:** a group of people or groups of people working in the same sector who decide to work together to have a larger impact on the market. Individuals hold onto their own property and assets.

- **Union:** an association of people working in the same type of organization who wish to defend their interests via negotiation, sit-ins, or strike.

- **Association or Club:** a group of people who gather to reinforce their linkages (mutual interests, religion, etc.) and for moral support.

Part 5: Identifying a Group to Provide SWM Services: Youth Group or Entrepreneur

Overview: Participants gain knowledge about two different models for getting solid waste management systems off the ground.
Time: 60 minutes
Resources:
- Flip charts, markers
- Case study, *Solid Waste Management: The Kiffa Experience*, pages 140-142

In contrast to working with youth groups to provide solid waste collection services, a town in Mauritania worked through an entrepreneur in a partnership approach with World Vision (an NGO) and the mayor's office.

Participants read the following case study.

Afterwards trainers discuss with participants the advantages and disadvantages to working with an entrepreneur.

Discuss if it would be possible in the towns which the participants represent.

Given the current situation in the town, would a youth group or an entrepreneur provide a better service?

Case Study

Solid Waste Management: The Kiffa Experience

as told by Sidina Isselmou, Urban Project Coordinator, World Vision

Two previous but unsustainable attempts at organizing a solid waste management system in Kiffa helped to lay the groundwork for the current system.

In 1994 the French Organization, Isle de France (CRIF), gave the city of Kiffa 5,000,000 UM (the currency is called ouqiyas, with that amount being equal to approximately $35,500) to put in place a SWM system. Kiffa's sister city in France sent over a used dump truck to assist in the task. Trash was collected for two to three months in a seemingly random pattern. Then the collection stopped.

The second attempt was mounted by the municipality and succeeded in evacuating some of the huge piles of trash that had accumulated around town. This system did not work on house to house collection, rather, it focused on the large piles. The system was not sustainable.

Questions come to mind regarding both attempts at organizing a SWM system:

- What kind of communication or education system was used to inform and engage citizens in assisting with the collection system?

- Did citizens pay for the service either directly by paying a fee or indirectly by paying taxes? Were they aware of the fee/tax for service?

In 1996 World Vision/Kiffa began to study the SWM problem. The organization sent some staff members to Nouakchott and to Nairobi to interview and observe the systems in place there. Following their study, they returned to Kiffa.

World Vision chose one neighborhood for their pilot activity. They chose the neighborhood that is the most densely populated, the oldest, and the dirtiest.

In order to market and publicize their upcoming activity, World Vision sponsored a three-week campaign of awareness raising. Activities were held on Thursdays and Fridays. A local theater group put on plays with a health message linked to the removal of trash. The citizens were mobilized to clean up the neighborhood and evacuate several gigantic trash piles. In total, the population succeeded in removing 27 truck loads of trash (minimum of 162 m^3).

World Vision adopted the approach of privatizing solid waste by hiring an entrepreneur to organize and implement the system. Working with the municipal authorities, World Vision put out a request for bid for an entrepreneur.

World Vision worked with the following four criteria to select an entrepreneur:

The desirable candidate:

1) lives in the pilot neighborhood and is well respected;
2) has experience managing a business;
3) has independent financial means;
4) demonstrated interest in this sector of business.

An entrepreneur was identified, selected, and hired for a three-month contract. World Vision agreed to pay the entrepreneur 50,000 UM per month ($365) for three months. These funds were to be used to repair equipment, pay workers, and to defray other start-up expenses. World Vision took the position of assisting the entrepreneur with start up costs until he got the business going by implementing a fee for service system. World Vision stated from the beginning that the 50,000 UM was a temporary subsidy.

The mayor's office donated four charettes (animal-powered carriages), the entrepreneur bought/contributed four donkeys. In addition, the mayor's office detached one municipal policeman to assist in the enforcement of the new SWM system: payment for services and imposing fines for illegal dumping.

At first there was an attempt to have a voluntary contribution system (*caution sociale*) but that idea did not work. The switch to a fee for service format has been more successful. The population agreed to pay 10 UM ($.07) per household per day for trash collection service. The collection service would take place five times/week and cost each household 50 UM ($.35) per week or 200 UM ($1.46) per month.

The expected costs and benefits of the service are as follows:

Population of the neighborhood	6,000
Number of households	945
Estimated revenue (100% payment)	189,500 UM/month
Estimated costs	
Salaries: 4 Charette drivers each @ 7,000 UM	28,000 UM

Experience To Date

After seven months on the job, World Vision reports that for four months the entrepreneur conducted a solid waste collection service without any problems. In the fifth month, the entrepreneur came to World Vision to complain that only 25% of

the population was paying their bill. Most households were two to three months late with their payment. By this time, World Vision had discontinued its 50,000 UM/-month subsidy and the entrepreneur was facing the challenge of getting a new business off the ground.

While the entrepreneur is still on the job and even thinking of expanding service, he and World Vision have identified the following **lessons learned**:

1. A neighborhood-wide contribution system is not viable for a long-term activity such as trash collection. A fee for service system is more advisable.

2. Do not let clients slip in their payments. If clients do not pay, discontinue their service.

3. While World Vision and/or the entrepreneur cannot force citizens to pay for the service, as organizers of the SWM system they recognize that citizens should be given a safe alternative for disposing of their solid waste.

Notes on findings

1. The idea of organizing a SWM system around an entrepreneur vs. an association is an interesting topic. The choice likely depends on both the availability of interested entrepreneurs vs. the competition of a well-organized association. There is no one right answer—the choice will depend on the preferences of the community.

2. World Vision, even with the hiring of a financially stable entrepreneur, recognized the difficulty and challenge to raising start-up costs. Attention to this detail will likely facilitate the success of new SWM operations.

3. The use of a municipal police officer to assist in the enforcement of environmental regulations is key to long term behavioral change.

4. The concept of a partnership agreement among the entrepreneur, the Mayor's office, and World Vision enables several things to happen: trash gets collected, the entrepreneur earns money, the Mayor's office looks good because the city is cleaner, but does not get the blame for increasing costs to the community, and World Vision increases its capacity to moderate social change.

5. The community members begin to see a relationship between fees and services. They also enjoy the benefits of a healthier environment.

6. The use of an entrepreneur taps into local economic power.

Part 6: Conducting a Feasibility Study

Overview: Conducting a feasibility study of the proposed solid waste management service sheds light on not only the economics and finances of the project, it can also serve as a marketing tool, and education campaign, and create team spirit among service providers.
Time: 4-5 days with 4-5 hours of classroom time plus field assignments
Resources:

- Flip charts, markers
- Case study, **Kaedi Training Program - Conducting A Feasibility Study**, pages 144-148

Trainers' Notes
This model of conducting a feasibility study was adapted from the book, Doing a Feasibility Study, by Suzanne Kindervatter, OEF International, 1987, to better meet the time-constraints of the participants in Kaedi, Mauritania.

This model is meant to be read, discussed, then followed (modifying as necessary).

Trainers should mention during discussion that in Kaedi, it was recommended that the youth groups present their findings as a request for a partnership. By identifying their strengths and what resources (human, some material) they could contribute to a solid waste management service, they were in a better position to present a list of needs to the mayor's office. What other options were open to them?

Kaedi Training Program - Conducting A Feasibility Study

by Terry Duffina

Goal: To assist youth group members in assessing the viability of a solid waste management program in their neighborhoods.

Activities: Meet daily for 8 sessions, approx. 4 hours per day plus field assignments

Trainers' Notes

1. Entrepreneur refers to the youth group representative participating in the workshop.
2. This session can best be applied in a training of trainers format.

Workshop Schedule

Day 1 - Feasibility Study Theory

- Using the images on page 32 in the book, Doing a Feasibility Study, the group discussed the idea behind a feasibility study and how it could apply to the current situation.

- They discussed the differences in what the entrepreneurs know, need to know, how they would get information, and how they would make a final decision.

Organization of Study

The trainer worked with the entrepreneurs to decide how they would conduct the study. She proposed a seminar format with guided instruction, followed by field activities that they would conduct. Information from field activities was analyzed by the group and then written up and presented to other people (in this case, youth group members, the mayor of Kaedi, and Africa 70, an Italian NGO).

Mapping Techniques

A solid waste specialist presented this session. She used her title to introduce this session. She told the entrepreneurs that the secret to becoming an specialist in SW was to look for trash, trash piles, and large producers of trash in different parts of a town.

She informed the group that a good way to note down the location of trash piles is by putting them on a map. As most maps are not so local in scale, she introduced the idea of drawing and designing maps of the different neighborhoods to be involved. The trainer had prepared a map of her own neighborhood. Using a question and answer format, she walked the entrepreneurs through the map. Then

she asked for a volunteer to make a map of the room participants were sitting in. Although the map was very simple, the point was made that anyone can draw a map. The group agreed on some common symbols for trash, roads, the market, etc., then they were assigned the task of drawing their own neighborhoods.

Day 2 - Exchange Experience on the Mapping Exercise

- The entrepreneurs each had a chance to explain their map. Other participants asked questions about the maps and discovered some new things about the city. One by one the entrepreneurs put their maps up on the wall. At first they had a hard time getting the spatial perspective, but by the end of the exercise they had put together a map of the city.

- They discussed the common elements of the maps, trash piles, roads, flood areas, markets, the amount of trash they produce, and so on.

- The mapping exercise was the first step in learning about the layout of the city. The maps were saved for use later when the entrepreneurs would need to plan collection routes.

Collecting Information in the Neighborhood

This session was broken into two main exercises. First, the entrepreneurs were divided into two groups. One group had to think up all the positive reasons to start a SWM program. The second group had to think up all the negative reasons for not starting up a program. This exercise worked extremely well and got the entrepreneurs thinking.

The Entrepreneurs Concluded There Were Both:

Positive Points

- Cleanliness of the population, the living area, the flora
- Health of people, flora, and fauna
- Well-being
- Spirit of solidarity achieved from solving a communal problem
- Financial—employ people, earn money to invest in other activities, working towards self-sufficiency
- Hope

Negative Points

- A negative reaction to the idea on the part of the population
- Health risks to employees
- Health risks of toxic substances
- Transportation of trash is problematic

Pollution at the final dump siteInexperience in the treatment and transformation of solid waste

The group was asked if there is a positive argument for each negative argument. Then, in the spirit of interviewing, the entrepreneurs were asked what they wanted to learn from the population.

They thought of the following:

- How open will the population be?
- Have households ever paid to remove solid waste?
- Will they buy the service?
- What is the best method to approach them on this topic?
- How much will they pay?
- Will people who buy the service continue to buy the service?
- Will the population have confidence in the Youth?
- Who should they ask, the man or the woman of the household?

With all of these questions in mind, role plays were set up in which the entrepreneurs had to use their best arguments to sell the service. Some situations included an entrepreneur and a female head of household, an entrepreneur and a man and a woman together, and an entrepreneur/health worker and a household member. As the entrepreneurs were all male, they had to giggle a bit before playing the role of a female.

Homework: household surveys

Day 3 - Finance Theory, Costing a Solid Waste Management Program

Using Doing a Feasibility Study, page 66, to categorize all the possible costs of starting a business, we introduced the idea of a financial analysis. In order to change the training style a bit the trainers used the following method which worked well.

Resources: The book, Doing a Feasibility Study; flip chart paper; markers; tape or desk tops; cassette player and tapes.

Activities:

1. Using the images from the book, eight images were cut out and attached to eight flip chart pages. Different pages were taped the to the wall or placed on different table tops, arranged in a circle.

2. The entrepreneurs were told that while the music played, they should brainstorm on the costs associated with each heading as it relates to a SWM business and write them down on the paper. When the music stopped they switched stations.

3. After each entrepreneur had worked at each station all of the flip charts were assembled. One-by-one costs were discussed, broken down by group.

For example, under the heading *Employees* the entrepreneurs said *office workers*, but they did not really understand that different office workers have different job descriptions. When we discussed the different types of workers the entrepreneurs came up with a director, a controller, a secretary, and a part-time medical person.

4. After discussion led to succinct lists, volunteers were asked to go to the market or the shops to get the price information.

Notes:

- On the day of the musical chairs exercise, two entrepreneurs participated who did not read or write. They just kind of sat and listened to the music. If the group is illiterate, a different method is necessary.

- Some of the specific items were difficult to relate to a solid waste management business (like packaging, money), so we dropped them. They were not essential to the study.

- This session took a long time to process in part because the entrepreneurs were very thorough with their brainstorming.

Homework: conduct a financial analysis

Some of the things they identified were:

Facilities: furniture, chairs, tables, a fan, a safe, a cash box, electricity and water hookups, office supplies (list)

Marketing: special clothing, microphone announcements, theater pieces, radio and television spots, a dancing evening

Materials: workers uniforms, charettes (and associated parts), donkeys (and their food and maintenance)

Day 4 - Neighborhood Analysis of Social Concerns and Assessing Demand for the Service:

- How many people were interviewed?

- What was their reaction to a SWM service?

- Are they willing to pay for the service?
- How much will they pay?
- Informal talk with solid waste specialist to respond to specific questions on urban environmental problems

Day 5 - Financial Analysis

Day 6 - Report Writing

Day 7 - Report Writing

Day 8 - Assessment of Feasibility

A scheduled municipal council meeting provided the impetus for the workshop on a feasibility study and the subsequent report writing. The first draft of the feasibility study showed that the project was not financially feasible. This was to be expected. Normally unrealistic start-up costs appear on the first draft of a budget, and not enough emphasis placed on selling the service to clients results in a bankrupt proposal. Revised drafts can mitigate the severity of the start-up investment by limiting salaries, stipends, personnel, office equipment, and materials to a minimum. Development workers and community groups must recognize, however, that some investment in start-up materials, unless these items can be borrowed, will be necessary.

Part 7: Putting Together a Service Business

Overview: Orienting participants towards the idea of trash collection as a product to sell.
Time: 90 minutes
Resources:
- Flip charts showing the four cases provided on page 150
- markers

Activities:
1. Trainers present information:

    - There are two kinds of production:

        1. individual
        2. mass production

    - Discuss what this means for solid waste:

        - one person collects trash from house to house
        - several people collect trash from house to house

2. Trainers present the four cases found on the next page, and the group discusses:

    a) From a business perspective, are they individual or mass production cases?

    b) Which case best describes the community's preferred model?

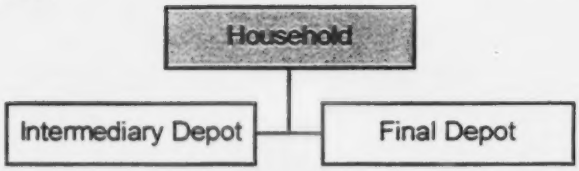
    c) Where in each case is there opportunity for a collection service to earn money?

3. Trainers present the idea of Product Quality:

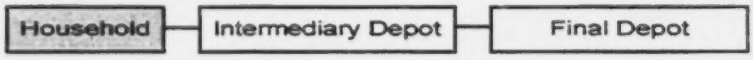
    What does it mean for a service to provide:

    - regular service
    - attention to detail in the rendering of the service
    - efficient service
    - adherence to the responsibilities committed to
    - a positive attitude: politeness, courtesy

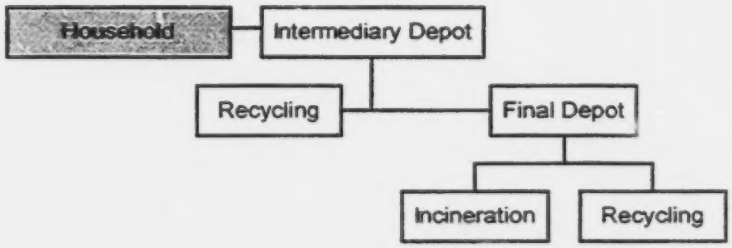
Case One



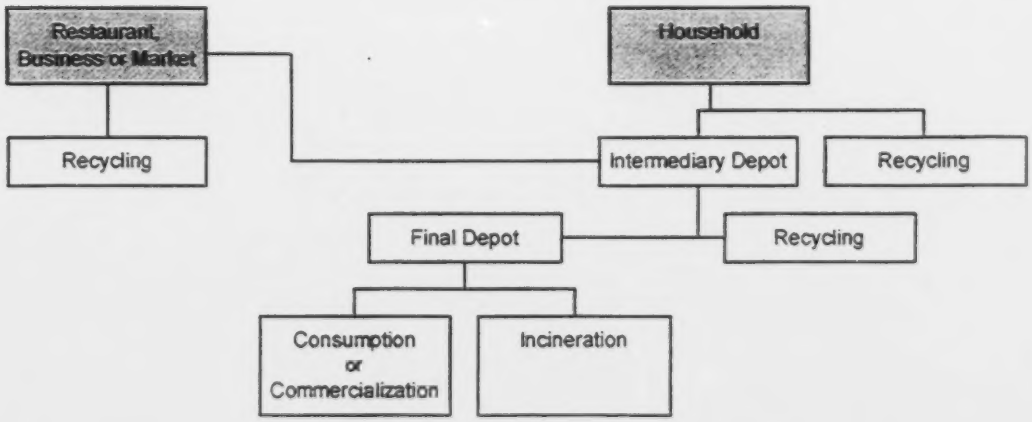
Case Two



Case Three



Case Four



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Part 8: Marketing a Solid Waste Management Service

Overview: The ability to market the service is as important as carrying out the service. This session provides knowledge and skills to sell the service using an interactive community development method.
Time: 90 minutes
Resources:
- Flip charts, markers

Activities: Trainers ask, *"What is marketing?"*

Responses should include:

- pricing
- advertising
- awareness-raising
- posters, radio announcements
- TV advertisements
- education to inform of the need
- education to make people want a service/product

Trainers ask, *"What is the goal of marketing for solid waste management?"*

Responses should include:

- informing clients what the trash collectors expect of them
  - how to store MSW
  - when to curb MSW for collection
  - acceptable items for collection
- convincing people to sign on as customers
- educating the population to the health dangers of the presence of trash
- encouraging potential clients to seek out trash collectors
- to convince municipal authorities that an under-serviced neighborhood needs service
- to convince authorities that a local group can perform the service well and link up with their service

Part 9: Application of Marketing Techniques

Overview: Provide an opportunity for participants to practice some marketing skills.
Time: 90 minutes
Resources:
- Flip charts, markers

Activity 1. Role Plays

Trainers ask participants to assume the roles specified in the following role plays. Trainers can prepare the roles on slips of paper in advance or have participants do stand-up scenes.

Scenario 1: Two trash collectors stop a young person on the street who has just thrown trash on the road. The trash collectors try to use their marketing/teaching skills and convince the young kid that throwing trash on the road isn't good.

Scenario 2: Three trash collectors are doing marketing in the target neighborhood. They have gone to see a family about selling their service. What should they say and do?

Discuss the situations and the marketing skills that were employed. Discuss how some skills could be improved upon. You may want to briefly review how to give positive feedback beforehand.

Activity 2. As an optional review, trainers may want to retrieve the text, **A Shocking World View of Trash** (page 27-28) and have participants read and discuss prior to conducting this activity.

Trainers, should then ask, *"From a health perspective, why do we want to collect trash?"* (note responses)

Answers ought to include elements such as those listed below, which offer a great lead-in to an environmental health lesson:

- stagnant gray water
- illness caused by microbes
- illnesses such as cholera, malaria, fevers, diarrhea, tetanus, headaches, AIDS
- trash invites rats, flies, dogs, cows to come and feast
- block roads
- smells bad

Discuss if this *question-the-participants* method would be good to use on potential clients.

Would it lead them to buy the solid waste management service? Why? Why not?

If not, describe some key questions that should be asked to convince potential customers to buy the service.

Trainers' Note: This sort of question and answer format is frequently used in health education. The methodology behind it, asking questions and having participants come up with the answers, allows participants to better assimilate information. This method is preferable to giving people information and expecting them to, or waiting for them to respond.

Using this method in an environmental health education manner, the development worker hopes to provide some information about environmental health, while at the same time, assisting clients come to their own conclusions about the need for trash collection service.

Trainers ask participants to list some other marketing techniques. Some ideas might be

- posters
- radio/TV education campaigns
- clean town/neighborhood contests
- school contests

Discuss which marketing technique would work the best in the community.

Part 10: Accounting, Bookkeeping, and Financial Reporting for Solid Waste Collectors

Overview: Small groups frequently lack skills in bookkeeping. The session suggests a simple accounting method. Transparency in accounting can help to minimize internal mistrust over funds. **NB:** Accounting methods vary from country to country. This method was used in Côte d'Ivoire, W. Africa. If your country or region uses another method, substitute it for this one.

Time: 6 hours (approximately an hour for each of five sections)

Resources:

- Flip chart, markers
- Prepared sample forms for:
- Client List, page 154
- Deposits, page 155
- Expenses, page 156
- Monthly Financial Report, page 157
- Year End Financial Report, page 158

1. Trainers discuss the pros and cons of bookkeeping with participants, then introduces different accounting tools and discusses them.

1. Trainers discuss the pros and cons of bookkeeping with participants, then introduces different accounting tools and discusses them.
   A. **Client List**

   - What is the role of the Client List?
   - Is it necessary in your community? Why or why not?
   - Who ought to keep and update the List? Why?
   - What sort of information ought to be kept on the Client List?

Client List				**Sector 1**
Date of Start of Service	**Client's Name**	**Address**	**Signature**	**End of Service**
6 June 96	Gonzales	8, Avenida Juarez		3 Feb 97
12 June 97	Ramirez	12, La Calle Arboles Bonitas		
15 June 97	Hernandez	1233 La Calle Rio Grande		

   B. **Deposits**

Trainers present this system called *1-notebook-1-collector-1-sector*. The idea is that one person on each trash collection team will keep the notebook, the same person will collect the money for only one sector of the community. A sector may coincide with a neighborhood or it may be a spatial designation established by the trash collectors.

There are several benefits to using this method. Collectors will get to know their sector very well, which will likely increase the popularity of the service. Collectors will have personal knowledge and history with the clients and will likely remember who has paid and who hasn't. Collectors should have clear lines of responsibility among the members of the trash collection business.

Each family subscribing to the service will have its own page in the notebook.

If participants are already involved in some type of business management and have a sense of the nuances of this subject, trainers asks them the following questions. (If the participants are brand new to business, the questions might need to be stated a different way or omitted altogether.)

1. What are different problems you have had in your collection systems?
2. How have you resolved them?

3. What do you think of the *1-notebook-1-collector-1-sector* system?

4. How would you improve it?

Trainers discuss how to fill out the form using the following example. Participants can make-up clients, amounts, and dates.

Deposits					
Client:	Gnoleba Family			**Sector:**	3
Address:	Qtr. Residentiel				
Date	**Amount Due**	**Amount Paid**	**Amount Remaining**	**Date of Payment**	**Signature**
3 Sept 97	75	50	25		
4 Oct 97	100	100	0	4 Oct 97	

C. **Expenses**

Trainers discuss the importance of recording all expenses related to the business. If participants do not already have a business, they might not be able to answer the questions easily. In that case, a lecturette format is more appropriate. Discuss:

1. What are some things you might need for your business?

2. Do you think the business should pay for them or an individual?

3. Do you think it is necessary to record expenses? Why or why not?

4. Who ought to authorize and keep a record of the expenses?

5. If appropriate, make a list of your expenses over the past month and note them in the chart. Imagine what those expenses might entail.

6. How can you decrease your monthly expenditures?

Expenses				
Date	Expense	Amount	Person	Signature
2 June 97	work gloves	100	Maria do Carmen Barbosa	
5 July 97	shovel	1250	João De Silva	

D. The Monthly Financial Report

The documents previously discussed can be thought of as record keeping. The monthly financial report is also a record that must be kept, but it assembles all the information previously recorded in a single format, which permits business managers to view, on one document, the status of their accounts each month.

Trainers ask the following questions:

- What is a monthly financial report used for?
- What do you need to do to make one?
- Who ought to compile the financial report?
- Draw up a financial report for your business using the preceding *Deposits and Expenses Record* to fill in the sample *Monthly Financial Report* on the next page.

E. Year End Financial Report

Trainers ask participants to think about what a year-end financial report might look like. What other documents would one need to prepare a year-end report? Fill in the *Year End Report*, on page 161, using the *Monthly Financial Report* as a sample for the 12 months of the year.

165

Monthly Financial Report			
Month			
Deposits		**Expenses**	
Dates	**Amount**	**Dates**	**Amount**
Week 1			
collector 1			
collector 2			
collector 3			
Total Week 1			
Week 2			
collector 1			
collector 2			
collector 3			
Total Week 2			
Week 3			
collector 1			
collector 2			
collector 3			
Total Week 3			
Week 4			
collector 1			
collector 2			
collector 3			
Total Week 4			
Total Monthly Deposits		**Total Monthly Expenses**	
		End of Month Total	

Year End Report				
	Expenses		Deposits	
Month	Item	Amount	Item	Amount
			Forward Balance	
			Accounts	
			Cash	
January	salaries		clients	
	other		other	
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				
	End of Year Balance			

Part 11: Equipment and Materials Needed

Overview: Selecting equipment and materials for efficient and affordable solid waste removal is a daunting task at best. The selection of equipment is intertwined with cultural beliefs, tastes and preferences, and realities of available funds. This section will present ideas and information about a very low-tech system, based on the assumptions that funds for investment are scarce and labor is abundant. (The UNCHS publication entitled Refuse Collection Vehicles for Developing Countries presents a broader perspective of the vehicle question.)

Time: 3 hours

Objectives: Participants will:

1. Gain knowledge of low-cost, labor intensive equipment for transporting solid waste.
2. Gain knowledge and experience with estimating costs of various pieces of equipment and materials.

Resources:

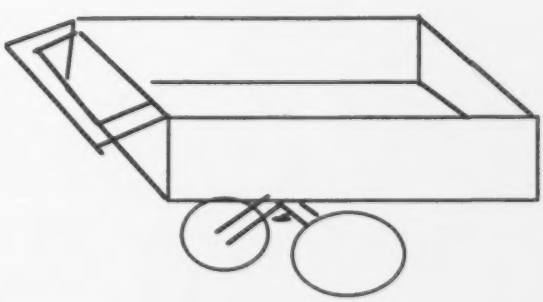
- Flip charts, markers
- Access to a hardware store, metal smith shop, and market
- Previously drawn town maps showing trash depot sites, households, roads, paths, and other important town landmarks.
- See also *Session 21, Part 6:* Conducting a Feasibility Study, beginning on page 144

1. Trainers introduce the topic of equipment and materials by asking questions about the method routinely used in the town for hauling things around. Ask participants to:

   A. Describe the equipment used in their communities: What is it made of? What are its components? How is it powered (motor, bicycle, animal, human)?

   B. How could it be adapted to haul solid waste?

   C. Draw a picture of the piece of equipment. (Expect a drawing of a wheel barrow or some sort of open cart with wheels, a push handle, and low-to-medium walls. It may resemble this drawing.)



This type of cart has a payload of 2-3 cubic meters, is frequently made of wood, can have bicycle wheels or other small vehicle wheels, and the axle is usually metal, as is the handle. Some sort of metal framework around the base of the cart holds it together and makes it more sturdy.

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D. How could this cart be adapted for better hauling of solid waste?

Some ideas include:

- Raising the walls
- Increasing the carrying capacity by strengthening the axle and using fatter tires like from a motor bike.
- Thinking about the merits of an iron-work frame, separate compartments for recyclable materials (biodegradable, paper, glass, metals, etc.).
- If animal traction is common in the town, how could this cart be modified to hook up to an ox?
- If hauling things using a bicycle or motor bike powered cart is common, how would this cart need to be modified?
- If the community has a tractor, could a cart be hitched to the tractor?
- What is the probable cost of a cart? (See *Session 17* for more images of solid waste transportation vehicles.)

E. Trainers ask, *"What other materials or equipment might trash collectors need in order to do their job?"*

Expect answers such as:
- protective clothing like boots and gloves
- tools like rakes and shovels

F. What will these items cost? Ask the group to formulate a total cost for the equipment and materials. Call that *Total Start-Up Costs*.

2. Assessing the Community's Resources. Discuss with the participants:

- Within the community, does anyone have a cart to loan or sell to the solid waste management group?
- Does the proposed group have its own equipment?
  - If so, does it need to be modified?
  - What would that cost?
- If nothing in the community is available, what resources can the community either contribute or secure towards the purchase or rental of a cart?

- Will the community need to write proposals?
- Does the municipality have a loan fund?
- Does the community have a loan fund?

- What about the other materials? Can they be provided through donations? Do they need to be purchased?

3. Working with the Clients. Trainers discuss with the participants how to work with the households.

    - Has the community already made a decision about what the households will use to store solid waste?

    - How do households store solid waste at present?

    - Do they use a trash can, basket, or pile the waste in a corner or on the street?

    - Working with the trash collectors, how would they prefer to handle the trash?

    - Will clients need to store the trash in a certain location? Sorted? In a container?

    - Communicating with the clients is essential in order to get a business off the ground. Discuss ways that trash collectors can communicate with clients.

4. Trainers discuss with participants how to envision a mental picture of how the solid waste business will be conducted. By the end of this session, participants should have a clear idea of what equipment and materials they will need, the cost, how they will go about funding their equipment needs, and who will take over the solid waste management system.

Part 12: Establishing a Budget and Assessing an Appropriate Fee

Overview: Participants will gain knowledge and experience in formulating a budget for their new enterprise. They will become familiar with terms such as *Start-Up Costs*, *Operating Costs*, *Total Revenues*, and *Profit*.

Establishing an appropriate fee for a trash collection service is essential to the viability of the business and the ability to make trash collection an income-generating activity. Working with the population to determine a reasonable fee and payable on a schedule acceptable to clients and business operators is also important.

Time: 2 hours

Objectives:

1. Participants will gain knowledge of pricing mechanisms and market-determined prices for solid waste management services.
2. Participants will formulate a budget for their SWM enterprise.

Resources:

- Flip charts, markers
- Town maps, previously prepared
- Population data for the town or community

Trainers' Notes

The most effective way to assess what clients are willing to pay is to ask them. As with previous sessions where trainers were advised not to engage the communities where development workers were not going to be permanently stationed, this note of caution applies here too. Methods such as focus groups, as in PACA exercises, should probably be avoided in the initial training scenario.

Alternative methods such as individual surveys or comparative studies (i.e.. comparing the cost of a bucket of water or the cost of a daily market table ticket) may be useful.

Two ways to approach setting a fee for a service are the market approach and the budget approach. The market approach involves assessing a potential client's willingness to pay for a given service. The budget approach involves making calculations based on projected expenditures and revenues and setting a fee based on a break-even scenario.

Trainers will divide participants into two groups to be designated the *Market Group* and the *Budget Group*.

The *Market Group* will formulate a method for assessing a fee based on comparative market studies, interviews, or asking people what they would be willing to pay for a solid waste management service. Trainers should allow the group to decide how it wants to collect this information.

The *Budget Group* will work with the figures from the start-up costs, the population of the town or community data and the following budgeting exercise to develop a fee based on expected revenues and expenditures.

The *Budget Group* might want to use a calculation sheet like the one below to assess the revenue-generating potential for a solid waste management business.

Budget	**Community-based Solid Waste Management**			
Costs	**Item**	**Cost**	**Quantity**	**Total**
	Start Up Costs			
	list items			
	list items			
Total Start-Up Costs				
	Operating Costs			
	Salaries			
	Maintenance			
	Other			
Total Operating Costs				
Revenues	**Item**	**Fee/Amount**	**Quantity**	**Total**
	Clients			
	Other Sources			
Total Revenues				
Total Operating Costs				
Total Start Up Costs				
Profit				

When the two groups finish their work, compare the suggested fees. Try to come to an agreement on a fee that will be acceptable to the market but also cover costs of the business.

Participants will begin to get a sense of the relationship between the number of clients and the fee paid. Also, participants will need to understand the necessity of covering monthly expenses and the process of working to pay off the start-up costs. The idea of deferring profits in favor of a maintenance fund is not always popular, but participants ought to consider the implications of not having a maintenance fund. Immediate coverage of all costs may not be possible, but projected cost/revenues should show a profitable and viable business.

Additional Activities for Solid Waste Management Session 22

Overview
A trash collection service can be an income-generating activity. Other benefits from SWM accrue to those who know where to look. Solid Waste is a resource full of opportunities to increase the production of a garden, produce energy, or sell or use recovered waste products. This session is divided into five parts:

Part 1: Analysis of Potential of the Waste Stream
Part 2: Artisanal and Industrial Recycling
Part 3: Composting of Solid Waste and Urban Agriculture
Part 4: Biogas Digesters
Part 5: Tires

Time: At least one hour for each parts

Objectives: Participants will:
1. Gain knowledge and experience of recycling, composting, urban agriculture and biogas digesters.
2. Use this knowledge to brainstorm how they might integrate some of these activities into their solid waste business.

Resources
- Flip charts, markers
- *Solid Waste Management Options* Chart
- Notes or results from Waste Stream Analysis

Trainers' Notes: If the participants have not conducted a Waste Stream Analysis, return to *Sessions 2 and 3*. These sessions will provide an ideal lead to the topic to discuss first—recycling.

Part 1: Analysis of Potential of the Waste Stream

Time: 1 hour
Objectives: Participants will:
1. Refine skills in identifying and classifying different types of solid waste (review findings of *Session 3 and 15*).
2. Discuss what is potentially valuable in the waste stream in their community.

Resources
- Flip chart, markers
- Examples of solid waste and of recyclable materials

Based on solid waste stream analysis, participants will discuss the items they view as potential for recycling.

Part 2: Artisanal and Industrial Recycling

Overview: Recyclable materials can be turned into products for sale. This session will discuss industrial and artisanal recycling.

Time: 1 hour
Objectives: Participants will:
1. Gain knowledge about income-generating activities with recycled materials.
2. Brainstorm ideas that they could pursue, additional training they might require and marketing techniques for their products.

Resources
- Flip charts, markers
- Samples of recycled products. Some examples might include note cards, flip-flops made from tires, garbage cans from tires, plastic for stuffing, powdered milk cans as spice holders or beverage cans as briefcase decoration.

1. Trainers asks participants to review what has been discussed to date regarding recycled products, who recycles and why. Ask participants what they have seen people do with recycled products. Expect answers like
    - sell the bottles
    - melt the metals
    - wash and resell the cloth

Ask if participants have seen any other things—like something new made out of a recycled product. Answers will vary depending on the region.

Trainers present ideas for recycling common items into artisanal goods:

- **Paper.** Trainers can hold up varieties of paper, including recycled paper, and talk about how paper is made.

Paper is made from ground wood fibers that have been pulped and mixed with water and other products, then dried and cut to form paper. Office paper is made by adding bleaching agents to the mix. Newsprint is made in a similar mixture, but with different chemicals added.

Some paper can be recycled and made into stationery and note cards. Trainers can show a sample if one is available. The process for making paper is time-consuming, but the technique is not too difficult or expensive.

Industrial paper recycling requires heavy machinery and investment.

- Does the participants' country have a paper mill?
- If they take recycled paper, what are the logistical considerations for getting paper to the mill?
- Could this be an income-generating activity?
- **Plastic.** There are many qualities of plastic on the market. Supple plastics can be recycled, but brittle plastics, like cello bags are not recyclable. Show examples of each found in the local community.

Plastic is not as easy or convenient to recycle on the community level. Most uses for recycled plastic involve melting machines and machines that recast plastic into another product.

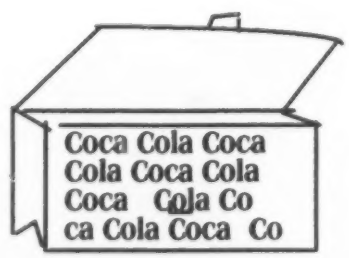
Trainers asks participants about possible factories that accept plastic for recycling.

- **Metals.** Metals are also made in different qualities. Ask a local metal smith to identify those types of metals useful to a smithy business.

Other metals like aluminum beverage cans cannot be melted down using community level equipment. Most artisanal recycled products from metals take the object as it is and create their product or modify the aluminum slightly to create a new product.

Ask participants for some examples. Here are three:

Spice carrying case made in Chad from NIDO milk cans



Senegalese Coke can briefcase

Caribbean Bottle top earrings

Trainers' Note: Most recyclables will be immediately seen as valuable things. Glass, metal, paper, some qualities of plastic—if there is value placed on them, people living in a poorer community will know about it. If there is no recognized and

immediate value, it may be difficult or challenging to create the demand on an industrial level. The opportunities for artisanal recycling are limited only by imagination. Revisit the marketing section above for hints on marketing for recycled crafts.

- **Glass.** Glass comes in different colors and qualities. Many countries have returnable bottle laws which greatly decrease the amount of glass in the solid waste stream. Usually, however, not all types of glass are included in the returnable bottle category; it is easy to see which ones are not.

Glass can be easily recycled. Industries generally prefer to receive glass cleaned and sorted according to color. At the community level, reusing glass containers occurs frequently. Making linkages with industrial glass recyclers will take more research and initiative.

Part 3: Composting of Solid Waste and Urban Agriculture

Overview
Solid waste generated in developing countries has a high content of biodegradable material which makes it suitable for composting. Various methods are known and well-documented for composting—any method suitable to local conditions may be adopted. This session will focus on the logistics involved in using solid waste for composting.

Household-level composting is also recommended as a source reduction method. However, households with limited available land have proved reluctant to put a compost pile in their yard. Fear of snakes, rodents, and insects sometimes prevent households from investigating composting.

Many thanks to Peter Ray for writing up his experience with composting in a document entitled *Compostage des Déchets Solides au Niveau Municipal*. The material for this session plan comes largely from this document.

Time: 1 hour
Objectives: Participants will:
1. Gain knowledge about the possibility of composting solid waste.
2. Learn where to go to get additional information about composting.
3. Discuss urban agriculture as zones for possible composting.

Resources
- Flip charts, markers
- Town maps
- Text, The Importance of Composting in Secondary Towns, page 169-171

Trainers introduces the text which follows.

The Importance of Composting in Secondary Towns

by Peter Ray

excerpted from *Compostage des Déchets Solides au Niveau Municipal*, originally published in French.

First of all, we must think about the lack of collection of and of vehicles for, solid waste management as a very serious sanitation problem in many towns in Côte d'Ivoire. With decentralization, the responsibility for the management of secondary towns has shifted in Côte d'Ivoire. Many municipalities lack the financial means and as a result are incapable of buying and of maintaining trucks and tractors to collect and transport solid waste. Given the lack of resources, town managers must begin to consider alternative strategies for sanitation problems and for managing solid waste. Further, it is equally important that municipal authorities apply a realistic approach to get concrete results and that they manage from the site.

[The author's] efforts were focused on the improvement of the management of solid waste in the town and we looked for locally available resources (labor, agriculturalists, local transportation, locally made equipment and materials). We launched a system of municipal composting which could be developed in different sites in the town adjacent to urban gardeners and agriculturists. Consequently, this system increases the amount of solid waste treated by the municipality.

We created a system with the following objectives:

- **Decrease the quantity of solid waste sent to the municipal dump**
- **Reduce the distance required to transport solid waste, which in turn economizes on fuel costs for the municipal trash truck**
- **Increase the production of small scale agriculturalists and encourage urban agriculture**
- **Create new employment opportunities and decrease urban unemployment**
- **Increase soil fertility in urban gardens**

In general, there are many methods and approaches to composting solid waste. Municipal authorities ought to use information available and modify it to suit their needs.

After studying the solid waste stream, we concluded that 80% of the material was organic. In some places, 90% of the solid waste was organic.

At the beginning of a municipal composting project it is necessary to look and survey the whole town before selecting zones in which to compost. In order to survey the town, you will need a town map, and complete the following studies:

- **Identify the primary sources of production of solid waste.**

Make site visits with the municipal truck and via site visits, note on the town map where solid waste is most often collected. Then, note the places where the most solid waste is generated. Begin to study the composition and the quality of the solid waste. Also note the sites where agricultural wastes are generated (by-products of cocoa, coffee, cotton, etc.).

- **Compile geographic studies of different sources of solid waste noting the composition.**

In a given sample from the solid waste collected in the different spots around town, sort the waste into the following five categories:

A. Organics: kitchen wastes, leaves and grass clippings, ashes (in general anything coming from the natural environment)

B. Cardboard cartons and paper: waste paper, torn cartons

C. Light plastics: water bags, drink bags

D. Heavy plastics: plastic sandals, heavy plastic bags, plastic plates

E. Miscellaneous: leather, cloth, clothes

Note on the map where solid waste samples show that less than 75% of the wastes are organic.

Another very important aspect is to note all the places where medical wastes (needles, plasma bags, blood bags, etc.) are found. Medical wastes are a serious problem for composting solid waste. Medical wastes pose health risks for all who come into contact with them. It is very important to identify the sites where medical waste is disposed of and work to develop a method for treating and disposing of medical wastes separately from other solid wastes.

- **Identify and describe the zones of urban agriculture.**

In the field and on the map, look for places suitable for urban gardening, horticulture, food cropping, and rice growing. Normally, low areas (valleys) are ideal. You can first begin by looking for places where there are already agriculturalists in place and where there is enough place to set up a compost site.

Also, check to ensure that there are no residents next to the compost site and there are no drinking water sources (a minimum distance of 100 meters).

- **Analyze the urban agriculture zones for their capacity to sustain a composting activity** (i.e., far from residents, far from potable water sources, etc.).

First the presence of composting at the site must not pose an environmental risk (i.e., contaminating a water source). Next, look at the distance between the site of solid waste production (with a minimum of 75% organic materials). It is equally important to assess the motivation of the gardener or the agriculturalist at the site. Finally, calculate the distance from the collection point to the municipal depot to ensure more efficient use of fuel.

- **Select an area as a pilot zone and work with the gardeners to teach them about composting solid waste and how to compost.**

Above all, the person selected for the pilot activity should already be very motivated to do agricultural work. In the end, increased agricultural outputs will be the reward and the motivation to continue the work. It is very important to explain the advantages of using compost and insist on adhering to the techniques of good composting even though the work of sorting and turning is difficult. Patience is very important during the initial waiting stages of the composting project. The fastest compost is achieved by turning the piles on a weekly basis.

The site for the composting station should have an additional 3-4 meters to separate the non-organic materials. They should be stocked while waiting to be sent to the municipal depot or burned in a pit on site. It is important to keep the composting stations clean and tidy and to send the non-organics to the final depot.

A site where the municipal trash vehicle can easily make a deposit is also important.

Composting in this West African town was successful due to the cooperation among the development workers, the municipal workers and above all, the urban farmers who were interested enough to give composting solid waste a try.

After reviewing the text, participants discuss the methodology and the practical implications for use in their town.

- Can they think of sites of urban agriculture activities?
- Are there only detached urban gardens or do some people have a garden in their yard?
- Could household gardens use compost?

Discuss with participants what farmers use for soil enrichment at present.

- If farmers use soil enrichment products, what would it take for them to try some composted solid waste?
- How could participants get farmers interested in trying this idea?

Not included in the text, but very important, is the demand for compost. Additional research may need to assess the market for compost.

Part 4: Solid Waste and Biogas Digesters

Overview
An under-utilized and relatively simple use for solid waste is the biogas digester. A biogas digester can produce methane, a relatively cheap and renewable source of energy for household use. This technology requires some investment in some infrastructure and some knowledge of mixing of waste products to get the right mix. This session will introduce basic concepts but will not debate the various designs.

Time: 1 hour
Objectives: Participants will:
1. Become familiar with the ideas, vocabulary, and technologies involved in biogas design and utilization.
2. If possible, visit the site of a biogas digester. (Known sites are in Cotonou, Benin; Thies, Senegal; and various locations in Nepal.)

Resources
- Flip chart, markers
- Text, Production of Biogas Energy, pages 174-176, and diagrams

Trainers' Notes
Training participants to construct, feed, and use a biogas digester takes at least 40 hours of initial training. Biogas production, although relatively simple, doesn't just happen—it takes careful planning and a concerted degree of maintenance to run the digester successfully. Field research on household and community level biogas digesters is still underway to determine the cost effectiveness.

Trainers discuss with participants the feasibility of using the community's solid waste to fuel a biogas digester. If a digester already exists in the community, discuss the opportunity of selling collected and sorted solid waste to the biogas operators. If the community maintains a high level of interest, the development worker can assist community members in obtaining more information and looking into possibilities for the future.

Sources of Information on Biogas Digesters:

- Cairncross, Sandy and Richard Feachem, Environmental Health Engineering in the Tropics
- Fulford, David, Running a Biogas Programme: A Handbook
- Kerr, Charles, Community Health and Sanitation
- Vogler, Jon, Work From Waste

Production of Biogas Energy

by Jon Vogler
taken from Work From Waste, pp. 209-212.

No process for using wastes has received so much recent attention as the production of methane gas or biogas from animal dung and vegetable wastes. In India and China huge programmes have been carried out to introduce biogas 'digesters' to the rural people and encourage their construction to provide cheap, renewable energy for cooking.

Principles

In the presence of air, organic materials rot so as to produce heat and give off carbon dioxide and nitrogen, provided the C/N ratio is low enough. [C/N refers to the carbon-to-nitrogen ratio. A low C/N ratio means there is plenty of nitrogen to nourish organisms responsible for bio-degradation of the waste.] The rotting is caused by minute creatures called bacteria and the kind of bacteria that need plenty of air are called 'aerobic.' If only limited quantities of air are present, a different 'anaerobic' bacteria digest the material, if the temperature is high enough (above 28 degrees C) and if the C/N ratio is not too high (preferably between 10 and 30 and never more than 35). Under these conditions, the rotting process gives off a mixture of about 35% carbon dioxide, a small amount of carbon monoxide (a poisonous, combustible gas), and 60-65% methane, a non-poisonous combustible gas with the familiar smell of rotting vegetation. This mixture is called biogas and is a safe and useful fuel for cooking, heating, and lighting in the home.

Human and animal dung (faeces or excreta) diluted with water in a ratio of 1:1 or 1:2 have a low C/N ratio and their availability determines whether a digester will be economic to operate. If a substantial quantity of dung is available, vegetable waste can be added but ligno-cellulosic materials, such as straws and wood wastes, are not satisfactory. Any materials used should not be strongly acidic or basic. If so, they must be 'neutralized' by other materials to give a 'pH' between 6.0 and 8.0. At the start a biogas plant must be seeded with bacteria, either from fresh dung from a ruminant (e.g., a cow) or a sample of slurry from a working digester.

Design of a Biogas Digester

The following are needed for a digester:

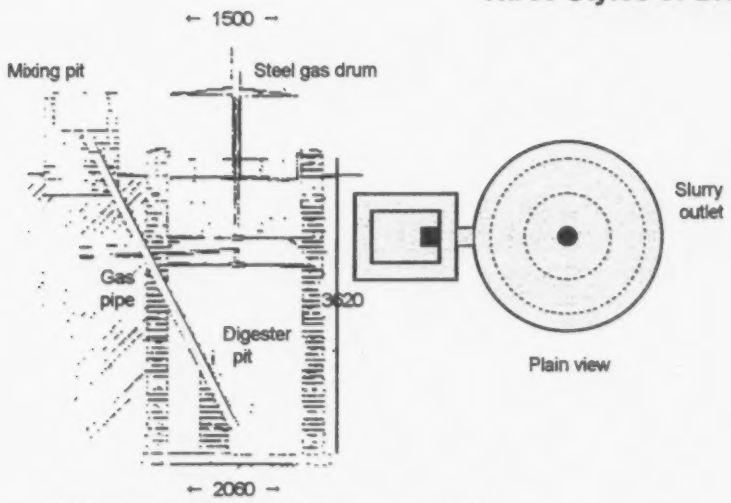
- A trough in which the materials can be mixed so that, even if they are disposed of at different times, the high C/N matter will enter the digester mixed with the low C/N matter.

- A digester tank, to hold the materials in a slurry of water, with space above for the gas given off to be collected, preferably under slight pressure.
- A supply of water (need not be clean).
- Pipes to take the gas to its point of use, and a valve (tap) to control it.
- Some means to de-sludge (remove solid material left at the bottom of the digester tank) from time to time.

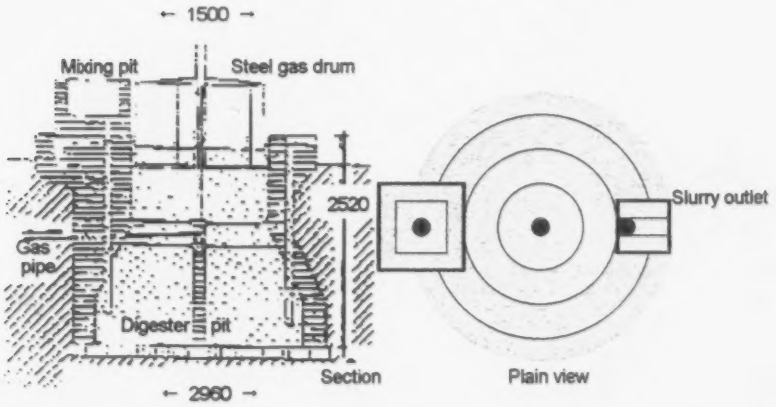
Two different types of digester have been widely used in [developing countries]: the Indian and the Chinese. There are many variations on the basic design[s], but they will not be studied here.

An important benefit from the production of biogas is that the sludge has a high fertilizer value, but it is not clearly known whether, as a result of the action of the bacteria, all disease organisms are killed and it should not be applied to food crops, especially if human excreta have been used, without careful precautions. Animal feeding should not take place until a safe interval has elapsed. This will vary in different situations but as a guide, sludge that has been digested for three weeks should be on pasture for three weeks before cattle graze on it.

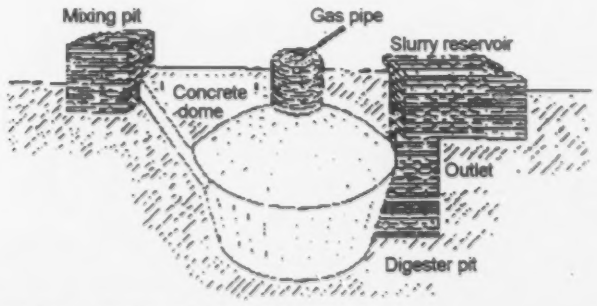
Three Styles of Biogas Plants



Straight design of steel drum biogas plant



Taper design of steel drum biogas plant



Fixed dome design of biogas plant

Source: Running a Biogas Programme: A Handbook, David Fulford, pp. 44-48.

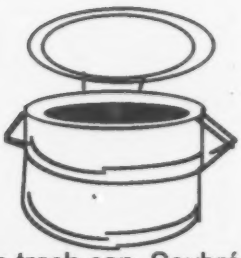
Part 5: Recycling tires

Overview
Tires can be a bane of existence for a SWM worker. They collect rain water and then provide a breeding ground for mosquitoes. They are heavy and take up a lot of space in a landfill. They give-off noxious fumes when burned. On the other hand, they are durable and with a bit of creativity can be recycled into other objects.

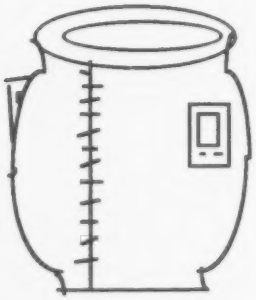
Time: 30 minutes
Objective: Participants will brainstorm about what to do with used tires.

Trainers ask participants to consider alternative uses for used tires. Some suggestions might include:

- making them into trash cans



tire trash can, Soubré model



tire trash can, UNCHS

- making sandals with them
- using them to create a playground equipment, such as a swing

If tires must be disposed of, see *Session 25* for a discussion of how to landfill used tires.

Trainers ask participants if making trash cans out of tires might be a good way to provide households with trashcans. Who might be able to make these trash cans?

Session 23 Special Wastes

Overview
The solid waste stream, even in very poor communities, is likely to contain hazardous waste. Community members and solid waste handlers alike need to be aware of what these items are, and take special precautions to dispose of them properly.

The three parts of this session address medical waste, hazardous waste, and used motor oil.

Time: Each session 1 hour, plus field trips

Objectives: Participants will:
1. Learn about the different types of hazardous wastes likely to be found in their waste stream.
2. Learn what they can do to dispose of these wastes properly.

Resources
- Flip chart, markers
- Text, **What is a Medical Incinerator?**, pages 180-183
- Town maps

Part 1: Medical Wastes

1. The best way to view medical waste is to visit a hospital or a clinic. A short field trip to the hospital and a discussion with the head doctor or nurse will give participants an idea of the level of awareness of the dangers of medical waste and the capacity of the facility to dispose of the waste safely.

2. Either at the hospital or upon returning to the training site, the Trainers lead a discussion about what participants saw at the hospital. Some key questions to discuss include:

   - What kinds of wastes, if any, did you see at the hospital? What makes medical waste different from household-type solid waste?

   - Where did you see the wastes? (in trash cans, on the ground, on the floor, out back, in a pit, etc.)

- What did the hospital say it did with its wastes? Did they treat other solid waste differently from medical waste? Describe what you saw.

- Why do you think medical waste needs to be disposed of in a different way from household solid waste?

Note sites on town map of hospitals, clinics, and dispensaries or other sites where solid waste has been deposited.

3. Trainers highlight that medical waste is different from household wastes and is potentially dangerous because of contamination from needles, used bandages, used plasma or blood bags, discarded tissue or other body parts, scalpels, other items used during surgery, glass vials of drugs, and tubes or bottles of medicines.

Discuss sharp objects. What can happen when sharp items are improperly handled? Discuss getting cut by a dirty scalpel, pierced by a needle, cut by a broken glass vial—what sorts of diseases could be transmitted?

Discuss items that are not necessarily sharp such as tissue and other body parts, used bandages, expired medicines, etc. What sorts of diseases or harm could come to people who handle these items improperly?

Do tissue and body parts go into the waste stream? Many cultures have specific beliefs about these items and dispose of them separately—even when they don't properly dispose of other medical wastes. Discuss briefly what happens to these discarded items.

4. Trainers ask: *"How can medical wastes can be disposed of?"*

Note responses on flip chart; possible responses include: digging a pit, and having the waste collected with household waste, incineration. Discuss the pros and cons of the options presented.

Ideally medical waste should be treated and disposed of on site. One way to do this is to build a medical waste incinerator.

What is a Medical Incinerator?

by Ulysses Sherman

A medical incinerator is simply a structure which allows for the controlled and complete burning of medical waste. For our purposes, the primary function of an incinerator is to support garbage above the ground to allow adequate air flow and thus complete burning (the reason that garbage piles are often seen smoldering instead of burning is that there is not enough air entering the pile). A secondary function is to provide a way of drying and igniting garbage which would otherwise not burn easily, e.g., wet bandages, rain moistened paper, food scraps, etc. The medical incinerators presented here do not have the capability to burn materials that do not naturally burn when dry, such as glass and metal.

Why Use a Medical Incinerator?

Medical wastes are dangerous in several ways: discarded syringe and IV needles can cause physical injuries or spread disease, soiled bandages can also spread disease, and discarded medicines can cause illness if retrieved and misused. Since the garbage collection services of most West African cities cannot ensure proper disposal of medical wastes, responsible medical centers dispose of their own wastes.

A medical incinerator is an appropriate solution to the problem of on site disposal of medical wastes. That portion of the waste which is flammable will be completely destroyed and that portion which is nonflammable will be disinfected. Although the cinders will contain metal needles and glass shards, these will no longer be infectious. These cinders can be buried to complete the disposal and eliminate further chance of injury.

Who Needs a Medical Incinerator?

Any hospital, clinic, or dispensary that produces wastes, including used syringes, soiled bandages or unused medicines, should have an incinerator.

How Do You Use a Medical Incinerator?

Using a medical incinerator requires more than simply putting a match to a pile of garbage. Correct usage means that the medical wastes are properly handled from the point of their creation to the disposal of their cinders. The first step is to collect the garbage in a safe and orderly manner. Garbage pails should be located in every room in which garbage is created. These garbage pails should be emptied at least once a day into a central garbage pail. This central garbage pail, too, should be emptied at least once a day directly into the incinerator. Garbage pails should be

189

solid walled to avoid spillage during transport. The area around the incinerator, too, should be kept clean to avoid injuries to the operators.

The incinerator can be ignited either every day or every few days, depending upon garbage production and incinerator size. If the garbage in the incinerator is relatively dry, a match can be put directly to the garbage to light it. If the garbage has been wetted by rain or contains many wet constituents, a wood fire can be built under the frill supporting the garbage. This fire serves both to dry and light the fire. If possible, the incinerator should be ignited at times when the immediate vicinity is relatively empty of people.

Once the garbage is completely burned and the cinders have fallen through the supporting grating they can be removed. A shovel and broom should be used for this as the cinders may contain needles and shard of glass. These cinders should be disposed of nearby to avoid spills. The preferred method of disposal is burying. A pit or trench near the incinerator works nicely to this end.

Finally, the incinerator should be inspected at least once every week. Common problems are cracks in the structure walls and clogging of the grill by unburned plastic or cans. If the grill is clogged it can easily be removed for cleaning. If the structure is cracked a mason should be called to make the appropriate repairs.

Where Do You Build a Medical Incinerator?

The placement of a medical incinerator is important. It should be relatively easy to get to, yet far enough away from other building or groups of people that the resulting smoke does not become too bothersome. In general, there should be no trees or buildings within at least 30 meters of the incinerator.

It should be noted that the smoke resulting from burning medical wastes, especially plastics, is unhealthy and constitutes a form of air pollution. Yet it is judged that the danger posed by burning these wastes is much less than the danger posed by not burning them.

A chimney can help to channel smoke away from the incinerator site by raising the level that the smoke leaves the incinerator. However, a chimney is supposed to do more than channel smoke away. A chimney, when properly constructed, serves to increase the temperature of the burn by allowing more oxygen to flow through the burn chamber. If the chimney is not correctly built to facilitate the burn process or if it is not needed to channel smoke away, it is likely an added and unnecessary expense.

How Do You Build a Medical Incinerator?

A simple medical incinerator installation consists of four walls supporting a metal grill at mid-level, a cover and a pit for dumping the cinders. Though relatively unimpressive by appearance, this simplest of incinerators works extremely well. Improvements and options which can be added to this design will be presented in the next section.

The four walls can be constructed of any durable, nonflammable material, though solid cinder blocks or geo-beton bricks [earthen bricks] are suggested. Hollow cinder blocks should not be used as the repeated expansion of air trapped in the chambers may cause cracks in the walls. A foundation, too, should be laid to prevent settling and undercutting by erosion. The opening in which wood is placed to start the incineration and from which the cinders are removed, requires a reinforced concrete or metal beam to support the wall above. Additional air holes should be left in the three other walls, usually in the second range of bricks. These air holes may be small so that they do not require reinforced beams above.

The grill should be made of metal. A mesh of iron rebar is preferred but a metal plate (from a car, for example) with holes punched in it or other metal screen may be used to cut costs. The grill mesh should have a spacing of 4-5 cm, though this can be adapted according to the material. In addition, the grill should be light enough to be easily removed through the opening in the front wall. If, for example, it is made of iron rebar, it can be made in two, lighter pieces. The grill is supported by two pieces of iron rebar which pass between the side walls, parallel to the front wall. One piece should be laid 5-10 cm from the front wall and the other the same distance from the back wall. These bars are set in the mortar between bricks at the same height as the tip of the opening in the front wall.

The cover is simply to keep the garbage dry and out of view until it is burned. It is removed and set aside during burning and replaced when garbage is next emptied into the incinerator. It can be made of any material, but preferably one which is nonflammable.

The pit for disposing of the cinders does not need to be large or deep. It can be dug either round like a well or rectangular like a trench. The diameter of the opening should be kept small to minimize the possibility of someone falling in or descending to gather unburned items. It is recommended that a small dike be built around the pit to avoid runoff from filling it up.

Options to Consider When Designing a Medical Incinerator:

1. **Concrete floor** - A concrete floor can be poured under the grill to facilitate collection and removal of the cinders. This floor should be poured so that it slopes toward the front opening, allowing rain water to drain out.

2. **Concrete skirt** - Concrete can be poured around the perimeter of the incinerator to facilitate collection of spilled garbage. This concrete can extend anywhere from 0.5-1.5 m from the base of the wall. Such a concrete skirt is important to the overall cleanliness of the site and is particularly recommended for the front where cinders are removed.

3. **Mortar finishing** - The outside of the incinerator may be mortared to give a smooth finish and seal the walls. This is primarily for esthetic purposes but in the case of earthen bricks it serves also to protect the walls and is recommended. It is common for this finishing to crack as the incinerator is used, but this does not affect the structural integrity of the incinerator. The inside of the incinerator should not be mortared as it does not withstand heat well and will rapidly fall apart.

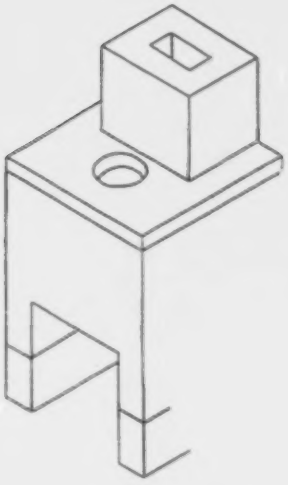
4. **Chimney** - The incinerator can be constructed with a chimney, but unless it is well designed it will actually inhibit the incinerator's performance. A chimney is desirable primarily to protect the garbage before burning and for esthetic benefit. A good chimney design is large and aerodynamic. If the smoke cannot escape easily, and it should be remembered that burning plastic creates much more smoke than wood, the fire will suffocate itself.

5. **Larger air openings** - Large air holes can be left in the walls to improve burning. As with the small holes, these are usually left in the second range of bricks. Large holes will require a reinforced concrete or metal beam to support the wall above.

6. **Broom and shovel** - A broom or rake and small shovel or dustpan can be made to facilitate the removal of cinders from the incinerator. Since the cinders will contain glass shards and syringe needles, the operator must be provided with tools to collect and dump them.

7. **Dumping pit covers** - Concrete slabs can be made to cover the pit in which cinders are dumped. These slabs serve primarily to prevent people from falling into the pit and to discourage the removal of unburned items.

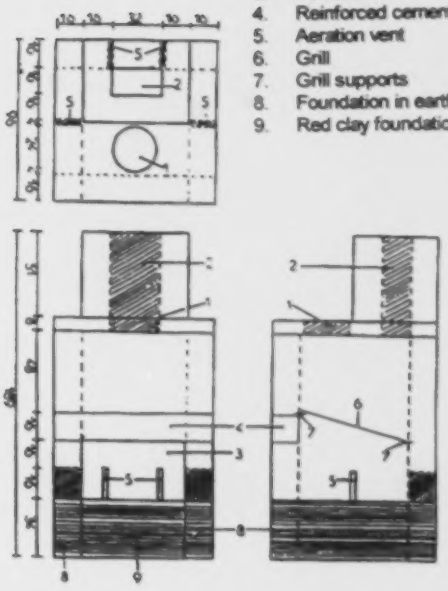
Medical Waste Incinerator*

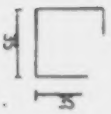


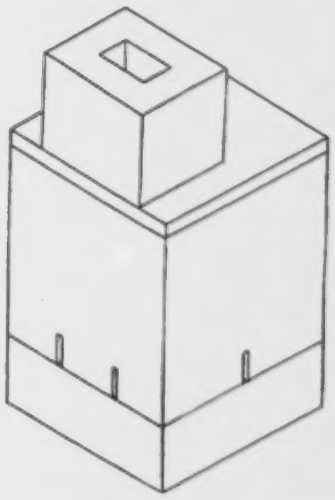
Front view and detail
Scale 1:15cm

Legend

1. Loading door
2. Chimney
3. Furnace door
4. Reinforced cement support
5. Aeration vent
6. Grill
7. Grill supports
8. Foundation in earthen brick
9. Red clay foundation







Back view and detail
Scale 1:15cm

* Source: ICE Archives, Peace Corps.

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Part 2: Hazardous Wastes

Overview
Using the results of the Waste Stream analysis, participants will identify hazardous materials.

Time: 30 minutes
Objectives: Participants will:
1. Identify hazardous waste found in the household waste stream.
2. Brainstorm about various ways to dispose of these hazardous items safely.

Resources
- Flip charts, markers
- Town map
- Waste stream analysis

1. Trainers ask a participant to summarize what types of waste have been discussed to date and how they are characterized. (If the different wastes have been characterized and noted, bring out the flip charts; if not, note them now according to Household, Recyclable Wastes, and Medical Wastes.)

Trainers asks participants about other things: batteries, empty spray cans, household medicines, detergents, bleaching agents, paint, solvents, used tires etc.

The Trainers also asks
- Did any of these items turn up in the waste stream? In any particular location? (market, business district, new neighborhood coming up...)
- How do people dispose of these things at present?
- Why are they considered hazardous?

Here are some examples of hazardous waste:

- **batteries** - corrosive leachate, poisonous to children and animals, contaminates soil and water
- **spray cans** - residue of product (insecticide, cleaning products)
- **detergents, bleaching agents** - leachate, possibly poisonous to children and animals, contaminates soil and water
- **tires** - collect water at the dump and provide an excellent breeding ground for mosquitoes, also when burned, produce a particularly noxious smoke

2. How can these items be disposed of safely? Are any of them recyclable?

Expect answers such as: separate out, incineration (except spray cans, tires and flammable items), bury in a designated landfill which has been properly prepared for handling hazardous wastes.

What can a development worker do to increase awareness about these household hazardous wastes? How can you convince a household member to help with solid waste management by sorting and separating these items from their regular solid waste?

3. If members of your community produce large volumes of toxic substances or regularly produce these substances, they need to work out a safe disposal system. It should be completely separated from household wastes. Industrial level hazardous wastes are not discussed here.

For information on industrial hazardous wastes consult: EPA, Hazardous Waste Management, United States Environmental Protection Agency, Office of Research and development, Office of International Activities, Office of Solid Waste and Emergency Response, EPA/600/M-91/031, September 1991.

Part 3: Used Motor Oil as a Hazardous Waste

Overview
Used motor oil is employed for a variety of things - put on roads to keep the dust down and sprayed on the ground to kill weeds. Other quantities of used motor oil are simply dumped onto the ground, into drainage canals, or dumped into the latrines, sewers, or directly into bodies of water.

Time: 30 minutes
Objectives: Participants will:
1. Learn about the dangers of dumping used motor oil into the regular solid waste management system.
2. Identify locations in the town where used motor oil is produced.
3. Investigate if there is a local/regional/national oil recycling plant accessible to their community.
4. Discuss the possibility of establishing a used motor oil recycling program in their community.

Resources
- Flip chart, markers
- Town map

Trainers' Notes
Trainers need to research this hazardous waste prior to implementing this session. While used motor oil recycling is recommended, few developing countries may have the capability of actually doing it. If there is no used motor oil recycling facility in the community/region/country, trainers needs to focus on educational aspects, safer

disposal methods and other activities to keep used motor oil out of the water ways, off the roads and fields, and into a safer disposal site. Targeting used oil-producing businesses like gas stations or the bus stop for environmental education sessions may be the most appropriate and effective strategy.

Trainers ask participants to locate sites on the town map where motor oil and used motor oil can be found. Discuss the following topics:

- What is the current practice for disposing of used motor oil?
- Where does it go?
- What does it do?
- Have you ever seen used oil spread on the roads to inhibit dust, or used in gardens or fields to kill weeds? Why might these be bad ideas?

2. Chances are that gas stations and the bus stop handle large quantities of used motor oil. If these places are disposing of used oil in an environmentally unfriendly manner, discuss how development workers might approach the offenders and assist them in improving their methods.

3. If the country has a used oil recycling program, or is a likely candidate to begin one, carry the discussion out further to include collecting the used oil at a single site and transporting it to the recycling plant.

4. The bottom line message, however, is *No Used Oil in the Solid Waste Stream!*

Session 24 Final Siting of Intermediary Depots and the NIMBY* Phenomenon

Overview
Establishing a solid waste management program takes the cooperation of all members of the community. Aspects of this program may include stationing an intermediary or final resting place for solid waste. For many reasons, community members may be reluctant to have depots on or near their property. This session will discuss a possible method for involving community members in selecting sites for intermediary and final solid waste disposal. (Technical criteria for safe site selection to be included in *Session 23*)

Time: 1 day plus site visits

Objectives: Participants will:
1. Gain knowledge about the spatial aspects of solid waste management.
2. Learn some tools and methodologies for interacting with community members about siting issues.
3. Work with the town map and develop strategies for siting intermediary and final depots.
4. Gain knowledge about criteria for selecting an environmentally sound landfill site.

Resources
- Flip charts, markers
- Town maps
- Results and information from *Sessions 3, 15, 16, 17, and 18*

Trainers' Notes
The most ideal way to work with a community on siting issues is to have been working with them all along on solid waste as a community partnership priority. Using the PACA methodology in this training situation is not recommended. However, some of the skills of working out spatial issues and logistics will assist development workers to be prepared to continue to work with their communities once they are at their permanent sites.

1. Working with the town map, information on current dump sites (formal, informal, permanent, temporary) and information about the choices the community has made about the kind of solid waste management system they prefer, participants identify on the map, potential sites for intermediate (if necessary) and final depot sites.

* Not In My Back Yard

Discuss with the participants the difference between selecting sites with and without input from community members. Are there technical criteria that must be included in the decision-making process regardless of tastes and preferences of the community? If participants can select sites, should community members accept their decisions? What is the use of selecting sites without input of community members? Who should be involved in selecting sites?

2. Once participants have identified potential sites, they should go out to the site and
   - **walk it out**, look at the surrounding land uses (residential, business, market, water source, grazing, etc.) in order to ground-truth the selections.
   - If geologic data are available, participants should **consult the data** for corroboration of sites selected.
   - While on site, **record major site conditions** such as current land use, ownership, topography, flora and fauna, bodies of water, estimate of size, and other defining characteristics.

Participants will return to the training center prepared to discuss their findings.

3. Participants will discuss the validity of their choices, possible objections from community members and strategies to provide information to community members in order to help them come to some conclusions about siting solid waste depots.
   - When the training participants go to their sites as development workers, what sort of planning would they need to follow?
   - What are some possible ways to present this information to communities?
   - If a community is planning on linking up its solid waste service with a municipal service, what kinds of planning and information sharing must take place?
   - What sort of documentation and record-keeping must be established?

Trainers' Notes
If participants are implementing these activities in their own communities, then people are almost ready to launch their solid waste management programs! The communities are mobilized, the trash collectors have been identified and trained, systems have been selected, and the municipalities are on board. But attention to details in the selection of the final sites for disposing of MSW will make the difference between environmentally sound disposal sites and disasters.

Session 25 Open Dumps Versus Sanitary Landfills

Overview
Preparing the final depot site for solid waste and the site management plan is as important as working out the logistics for getting the solid waste out of the household and neighborhood. The difference between an open dump and a landfill is an important distinction when working to create a safe and properly managed solid waste disposal site.

Individual communities may or may not have to make decisions about landfill sites, but their collective voice may be powerful. A landfill may be proposed in one community but not in another. A community may be given a role in the site selection process. Someone in a community may decide to operate a landfill as an income earning business. For these and other reasons, providing information to people at the community level is important .

Time: 2 hours - site visit to current dump for training. Implementing changes at a dump/landfill could take years.

Objectives: Participants will:
1. Gain knowledge about current practices at the depot.
2. Gain knowledge about safe disposal for solid waste.
3. Gain information about preparing a landfill for their community.
4. Discuss operation and maintenance systems for their site.

Resources
- Flip charts, markers
- Town maps
- Text, Setting Up Solid Waste Management Facilities, pages 193-194
- Text, Landfill Design, pages 196-197

Trainers' Notes
A visit to the dump might well require getting advance permission from dump authorities and others. Also, if participants will be asking questions, some preparation work will need to be done.

Properly siting, designing, and operating and maintaining a landfill is a professional job. Development workers are encouraged to use the full spectrum of human resources available to them when taking on a landfill activity.

1. Trainers prepare participants for a trip to the dump. Depending on the conditions at the dump, the group may need more or less preparation to face the deplorable

health conditions, the poverty of the scavengers, and the possibly brutal and unsafe things going on. If participants can get beyond the negative aspects to see the functionality of a dump and why it is crucial to prepare the land properly, to receive solid waste, and to manage the site properly, then a trip to the dump is worth the time.

In the next session the topic of scavengers will be addressed.

2. After the visit, participants will want to discuss what they observed. Trainers should allow participants to express some of their shock, but then steer the discussion to the structure of the dump and its use in a solid waste management system.

3. Trainers should focus the discussion on the differences between a dump and a landfill. On a prepared flip chart put up the definition of a sanitary landfill (sometimes simply called a landfill).

> **Sanitary Landfill:** Land waste disposal site that is located to minimize water pollution from runoff and leaching. An operation and management system is put into place in order to maximize use of the space and to reduce negative environmental impacts. Waste is spread in thin layers, compacted, and covered with a fresh layer of soil each day to minimize pest, aesthetic, disease, air pollution, and water pollution problems.

Discuss characteristics of the dump that the participants just visited. Discuss how the dump is or is not a landfill, using the definition as a guideline. Discuss what damage could occur under the current management of the dump.

Expect such issues as:

- ground and surface water contamination
- soil contamination
- soil erosion
- methane gas build-up
- increased volume of vectors for the spread of diseases to humans
- the land dedicated to stocking solid waste will be consumed faster with poor landfill practices.

Characteristics of a Sanitary Landfill

Location Restrictions	Operating Criteria
• Airports	• Procedures for excluding hazardous wastes
• Floodplains	• Daily cover
• Wetlands	• Disease vector control
• Fault areas	• Explosive gases
• Seismic impact zones	• Air criteria
• Unstable areas	• Access control
	• Run-on and run-off control
	• Surface water requirements
	• Liquids management
	• Record keeping

adapted from EPA Decision-Makers Guide to Solid Waste Management, 1989

4. Trainers present the text, **Setting Up Solid Waste Management Facilities**, on pages 193-194, and discuss the policy recommendations in the given milieu.

text

Setting Up Solid Waste Management Facilities

When setting up solid waste management facilities strict attention to details of site selection increase the likelihood of reducing damage to the environment. Three different phases of setting up facilities include site selection, site preparation, and site operation and maintenance. In Tunisia, recent improvements in solid waste management practices have resulted in realistic recommendations and criteria for setting up solid waste management facilities.

Site selection criteria include assessing the potential impact on public health, requiring a feasibility study, excluding restricted areas such as national preservation areas, 25-year periodic flood areas, Holocene (we are currently living in the Holocene period, a fault that occurs during recent times is called a Holocene fault) fault, geologic disaster area, or area having national historical or archeological significance.

In addition to the above criteria, landfill sites must meet the additional selection criteria:

- **Proximity to water supply**. The bottom of the landfill shall be at least 3 meters above the seasonal high ground water surface. The edge of the landfill shall be no closer than 60 meters from surface water, an aqueduct, or a canal.

- **Aquifer protection**. Domestic solid waste landfills should not be located over known public water supply aquifers or their recharge zones unless there are no other feasible alternatives. All domestic landfills located in aquifer recharge areas shall comply with the guidelines and be subject to additional water quality monitoring to protect the aquifer from contamination.

- **Land Use**. The landfill site shall not be located so as to have a significant negative impact on existing land uses. New landfill sites shall comply with the provisions in force regarding existing land use.

- **Protection of flora and fauna**. The landfill shall be located and operated so as not to have a significant impact on flora and fauna on adjoining land. The landfill shall not be located within 300 meters of a national preservation area or an area having national historical or archeological significance.

- **Proximity to public facilities**. The landfill shall not be located within 300 meters of a public facility.

- **Visual screening**. All landfill operators shall maintain a buffer area around the landfill, providing visual screening from adjoining property.

- **Access roads**. Landfill access roads shall be located and constructed so as to have a minimum impact on adjacent residents and land users.

Exemptions from location standards

A [national authority] may, on a case-by-case basis, grant exemptions from the above criteria. An exemption will be granted only if the site developer can justify, based on the environmental impact assessment, that the exemption will not harm human health or the environment (Solid Waste Standards and Regulatory Measures in Tunisia 1995, pp. 31-32.)

In addition, standards requiring the mandatory use of landfills must be enacted at the national level.

- Sanitary landfills must be used.

- Uncontrolled dumps, as well as random dumping, must be prohibited.

- Open burning must be prohibited (Solid Waste Standards and Regulatory Measures in Tunisia 1995, pp. 31-32).

5. The next decision to be made, following the site selection criteria, is the landfill design. While landfill design is important to the protection of the environment, the costs associated with design often far exceed the means of a municipal government. Instead of insisting on inappropriate technologies, solid waste managers and community members should place emphasis on site selection and then an effective operations and maintenance plan. Nevertheless, the following design specifications can be recommended. These specifications are taken from Solid Waste Standards and Regulatory Measures in Tunisia, pp. 32-34.

Trainers lead a discussion on design criteria. How do development workers raise a community's level of awareness on different issues they should consider when selecting a site, and deciding on whether to support the cost of a proposed design through their taxes?

Landfill Design

Required technical feasibility study to include the following components:

- type and amount of waste to be landfilled;
- site hydrogeology;
- analysis of base soils, physical and chemical properties;
- topography, surface water, and prevailing winds;
- water content and estimated leachate generation; and,
- leachate and methane gas generation management options.

Landfill Lining Options

The nature of the base soils and how they are used during landfill design and operation are one of the most important aspects of a landfill. A landfill design must take into account soil characteristics and ground water or bedrock depth. An unsaturated, granular soil has the advantage of containing the most harmful effects of the leachates through appropriate physical or chemical treatment. The containment generally depends on soil permeability depth.

Engineered lining system standards are currently the subject of worldwide debate. While they do provide a high degree of environmental protection, such systems are very costly and make some projects financially unworkable. In some cases, operators lack resources to maintain these systems and adequately treat leachates, resulting in worse pollution problems than if simpler and less costly systems had been chosen.

Choosing lining systems

Lining systems must be chosen case by case based on performance, rather than on technological criteria, to ensure effective environmental protection at an acceptable financial cost.

- **Natural landfill liners**. In general, landfill base soils with a [low permeability of 1×10^{-7} cm/sec, based on the results of a percolation test] do not require an engineered lining system. Natural soil liners (clay) shall have a minimum thickness of 60 cm, and a maximum permeability of 1×10^{-7} cm/sec.

- **Engineered lining systems**. Base soils having a permeability of between 1×10^{-7} cm/sec and 1×10^{-5} cm/sec with a depth of more than 3 meters must be studied case-by-case to determine whether a protective lining is needed. These coverings may be either low-permeability clay or synthetic materials (plastic).

Procedures for determining lining systems

Soils with permeabilities greater than 1 x 10^{-7} cm/sec shall be reviewed by a national or regional authority such as the Ministry of the Environment.

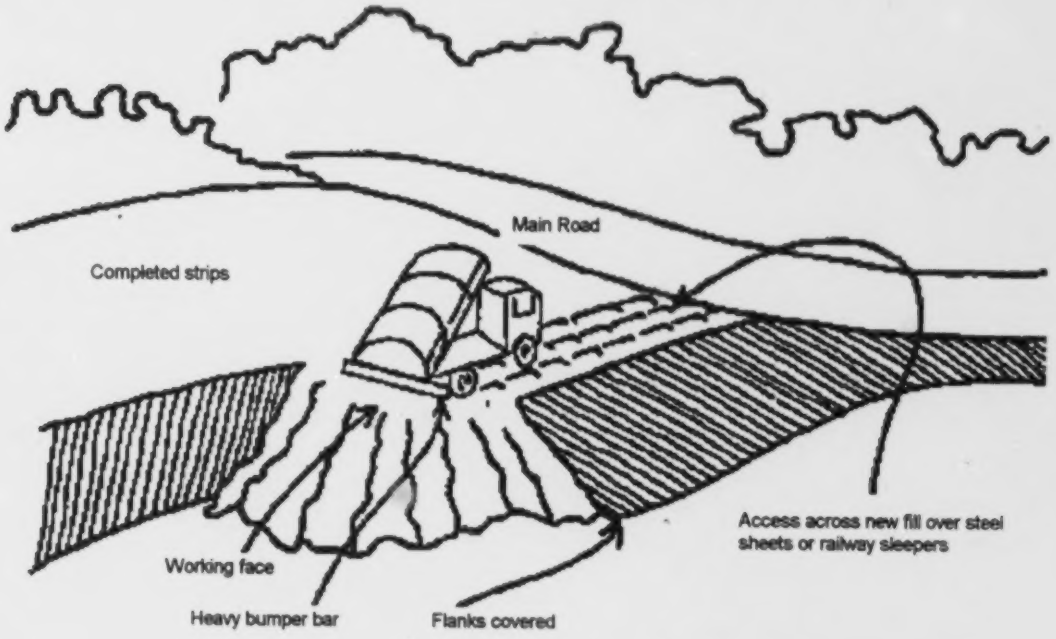
- **Synthetic liner**. Geomembrane synthetic liners shall be made of high-density polyethylene with a minimum thickness of 1.5 mm, installed in accordance with the manufacturer's instructions.

Landfill Leachate

Liquids will collect in a landfill over time which may or may not contain hazardous substances and may or may not rise to a level to overflow a landfill. A leachate collection system may be included in the design if either hazardous substances or overflow threaten the landfill. Frank Flintoff, in Management of Solid Waste in Developing Countries, questions the practice of collection of percolate as it is costly and difficult having little residual value in relation to the ultimate use of the land (Flintoff 1976, p. 112). He advises that communities reject sites that prove faulty under the scrutiny of a hydrogeological study. He maintains that the major problem of landfills in developing countries is the potential for contamination of surface water which can be controlled by site engineering (Flintoff 1976, p. 112).

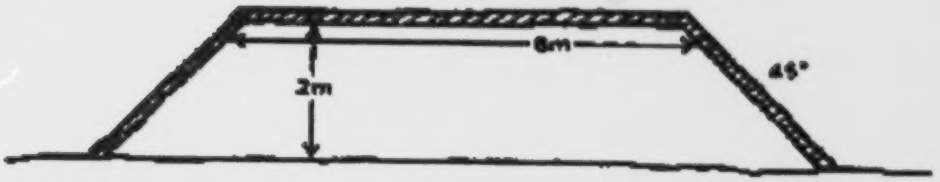
Taken from Solid Waste Standards and Regulatory Measures in Tunisia, pp. 32-34.

Small Manually Operated Sanitary Landfill Designs*



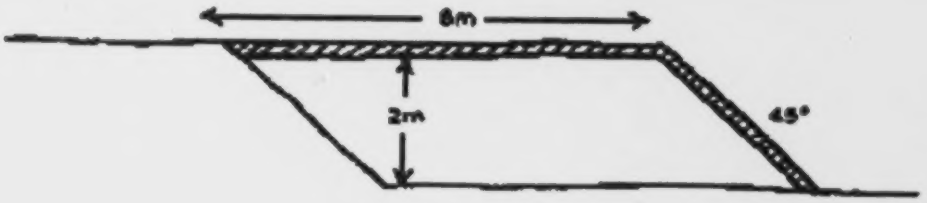
Strip width 6 metres; only one vehicle at a time on working face; capacity 30-40 tonnes/day.

COVERING MATERIAL, top and flanks



First strips: cross-section of fill 12 sq. m.
cross-section of cover 12mx20cms 2.4 sq
Ratio by volume, about 1:6

Subsequent strips: cross-section of fill 15 sq. m.
cross-section of cover, 9mx20cms 1.8 sq. m.
Ratio by volume, about 1:6



* Source: Management of Solid Waste in Developing Countries, Frank Flintoff, p. 124.

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Manual Landfill, Formation Of First Strip*

1. Section through original site which is about two metres below the level of the surrounding area.

2. A hardcore road is built from the nearest main road to the point where filling is to commence. Drive in pegs to indicate width of strip to be formed and the levelling of filling.

3. Commence tipping wastes at this point.

The drags (or rakes) used for manual levelling should be from 1.8 to 2 metres long.

4. The heaps of wastes are levelled by a three-tine drag (or rake) with a handle about 2 metres long and the flanks are formed to an angle of about 45°. Levels and strip width are guided by pegs driven earlier.

5. Every day the levelled wastes and the flanks are covered by between 15 cms and 25 cms of soil, sand, ash or composted wastes , etc. Daily or weekly, the working face is covered to form an enclosed cell of wastes.

6. Always take the vehicle right up to the working face to avoid dumping wastes on covered areas. If vehicles sink in, extend the hardcore road as far as possible, then use railway sleepers laid transversely, or steel sheets, to form a track over the newly deposited wastes. Always provide a heavy bumper bar at the point where vehicles unload.

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6. Trainers move to the last issue of setting up a landfill: the operation and maintenance plan. The following recommendations are taken from Operating and Managing Communal Landfills in Hungary, prepared by Research Triangle Institute, pp. 8-24.

In communities where few or no regulations exist to govern operation and maintenance of a landfill, the owner or manager institutes a plan. A plan ought to protect the health of the public and the surrounding environment, and specify routine procedures as well anticipate some abnormal situations. It must define daily activity but also be flexible.

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* Source: Management of Solid Waste in Developing Countries, Frank Flintoff, pp. 126-127.

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The best-designed landfill will be of little value
if it is not constructed and operated in an orderly, controlled manner.
Unlike a typical civil works project,
a landfill is continually under construction
until it accepts its last load of waste and closes:
therefore, construction and operation are actually one function.

Elements of a Management Plan Include:

1. Hours of Operation
   - dependent upon the volume of waste delivered for disposal
   - number of staff able to process in-coming waste including weighing, recording, determining type and origin of waste, and directing haulers to the appropriate disposal site
   - hours should be set to coincide with hours of collection, but also to allow for covering waste at the end of the day
2. Controlling Access to the Landfill Site
   - enclosing the site and posting guards to monitor after-hours use
   - posting access information at the entrance to inform users of the following information:
     - name of the facility and permit number (if available)
     - name, address, and phone number of the permitee
     - days and hours the facility is open to accept waste
     - types of waste accepted and not accepted
     - penalty for unlawful dumping
3. Directing Incoming Traffic
   - maintaining an orderly flow into and out of the landfill
   - preventing traffic from by-passing the check-in point, or weigh station
   - preventing small vehicles from causing traffic problems at a landfill when conditions are especially muddy

- due to the variety of vehicles using a landfill, separate discharge areas should be used for mechanically discharging vehicles and manually discharging vehicles

- the check-in gate attendant can assist the machine operator at the site to avoid back-ups of vehicles waiting to discharge

4. Measuring Incoming Waste

   - Two options for weighing waste include using a weighbridge to weigh vehicles entering full and weighing the vehicle leaving empty. The difference is the amount of waste disposed. An alternative is to take representative samples at specific times throughout the year and use them as constants to determine the volume of waste entering the landfill.

   - Determining the volume of waste entering the landfill is essential to the life and planning of the facility.

5. Unloading Incoming Wastes

   - Communal solid waste should be unloaded at the base of the working face of the landfill. Recyclable materials should be removed before the remaining waste is spread onto the landfill. It should be spread and compacted in 0.5 meter layers.

   - Unusually bulky items, such as discarded furniture, should be recycled or be crushed before landfilling.

   - Industrial wastes should be evaluated to determine the most efficient and environmentally safe disposal method. No approval should be given for hazardous or toxic waste. Dead animals should be disposed of at a separate facility. Wood or coal ashes should be stored separately. Tires should be stored separately if there is a market for them, otherwise they should be placed at the bottom of a daily cell of waste and be covered.

   - Brush and other clean wood waste should be stored separately. The wood can be chipped and used for landscaping or composted.

   - Demolition waste such as cement blocks should be separated and stored but without a daily cover of soil.

   - Waste with high moisture content or liquid wastes should not be allowed in the landfill. Too much leachate will likely result from routine disposal of liquid wastes.

Trainers discuss the proposed operating plan with participants. An interesting question to explore might be, *"If your town cannot meet all of these standards for operating a sanitary landfill, what should you do?"*

7. Trainers continue the discussion of landfill maintenance with a presentation on the organization of a landfill into cells and lifts.

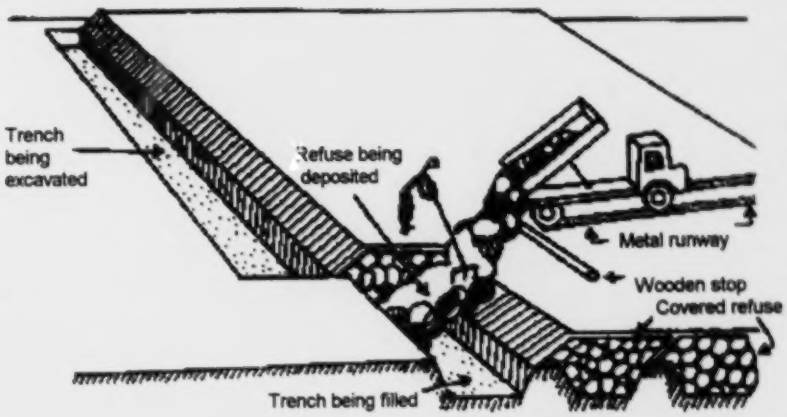
The cell is the common building block in sanitary landfilling. All waste received at the landfill is spread and compacted in a confined area. At the end of each working day, it is covered with a thin, continuous layer of soil which is also compacted. The compacted waste and soil constitute a cell. A series of adjoining cells all the same height makes up a lift.

A cell's dimensions depend on the amount of waste placed and compacted on that day. Cell height is determined by the operator, the equipment, and the conditions of the site. In general a cell height of 2-3 meters is recommended. A shallower cell will spread the waste too thin, result in a larger working face, and use more daily cover soil.

Placing daily cover material is essential for controlling litter, insects, birds, rodents, and fire. Daily cover should have a compacted thickness of 15 cm and can be of any soil type. Sandy soil may be used although clay soils are more desirable.

Daily cover will slow downward water movement through the landfill. Leachate could seep out the side of the landfill with accompanying odor problems, water pollution, and destruction of vegetation. Daily cover should be removed within 10 m of the edges of the cell before a new layer of waste is added.

The Trench Method*

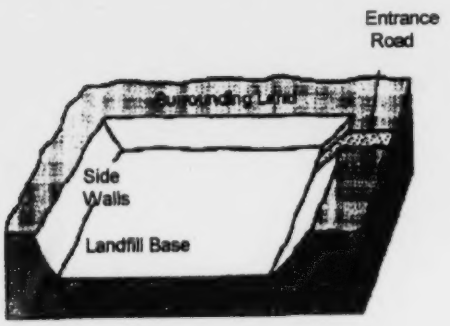


The trench method of controlled tipping. The heaps of refuse are levelled and formed to a 45° slope using a long-handled rake, and covered by at least 150 mm of soil excavated from the next trench. The width of the trenches should not be less than their depth. Source: After Flintoff (1984).

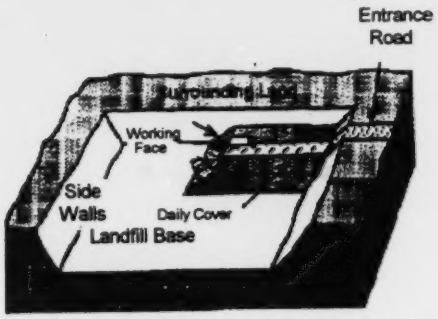
* Environmental Health Engineering in the Tropics, Sandy Caircross and Richard Feachem, p. 194.

Sequential Filling Plans*

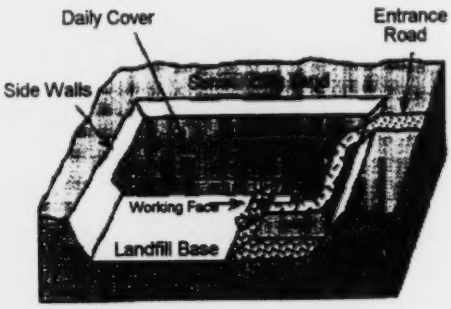
Landfill - As Constructed



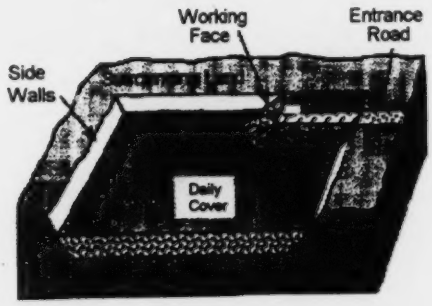
Placing First Waste Layer



Placing First Waste Layer



Placing Second Waste Layer



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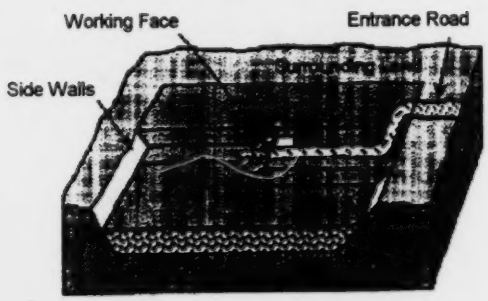

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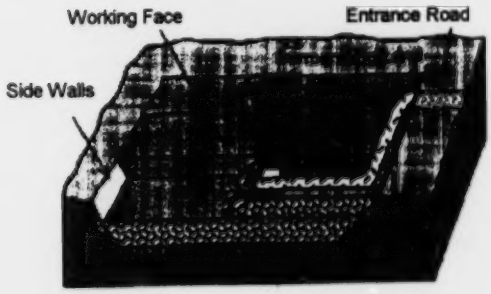

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* Source: Operating and Managing communal Solid Waste Landfills in Hungary, prepared by Research Triangle Institute, pp. 19-21.

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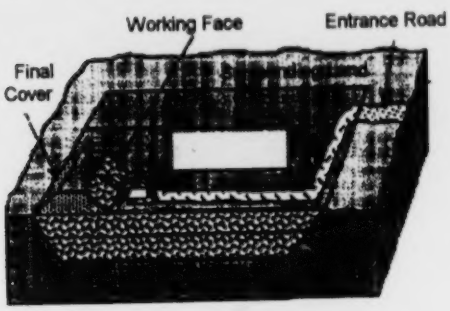
Placing Third Waste Layer



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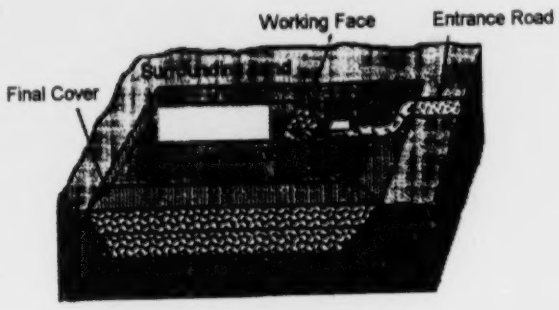

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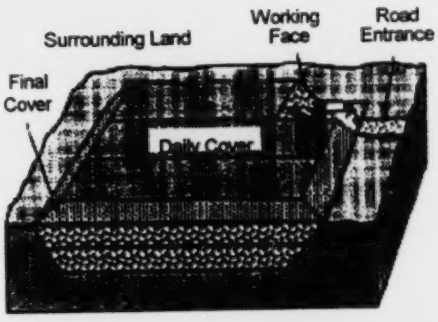
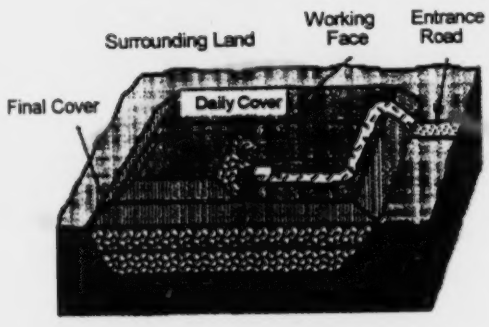
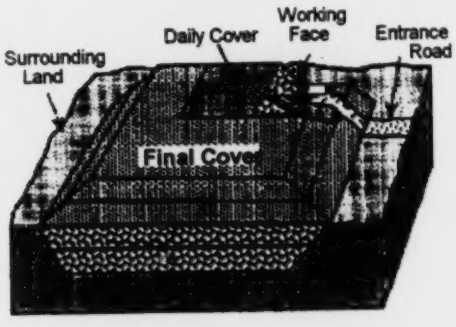


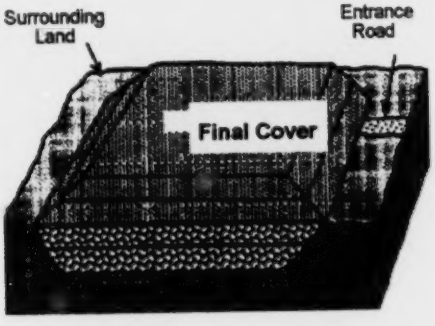
Placing Fourth Waste Layer



Placing Fourth Waste Layer



Closed Landfill



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Based on these readings and discussion, trainers ask for an assessment of equipment and materials needed for maintaining the landfill at this recommended level.

Expected responses include:

- bulldozer
- tools such as rakes and shovels
- laborers
- protective clothing like particle masks, boots, gloves for the workers

Discuss with the participants the reality of having all of the equipment in consistent operating condition and dedicated to use of the landfill. If this is not a realistic scenario, discuss what the participants might do given their situation. Talk about how a landfill could be managed without the use of a bulldozer.

9. Participants brainstorm how to construct a landfill from scratch at their sites. Ask them to draw plans.

    - Does it fit in with sites selected for intermediary and final depots?

10. Participants develop an operation and maintenance plan that will work well in their environment. If the community lacks critical equipment, assist community in deciding how to work without the equipment or how to obtain the equipment.

Session 26 Scavengers

Overview
From the visit to the dump, participants will likely have comments and concerns about the presence of scavengers at the site.

Time: 1 hour

Objectives: Participants will:
1. Gain knowledge about the role that scavengers play in different phases of SWM
2. Brainstorm about possible ways to manage scavengers in order to allay participant's fears and to improve the quality of life of the scavengers.
3. Discuss the possibility of getting the materials to the scavengers before it hits the landfill, obviating the presence of scavengers at the landfill.

Resources
- Flip charts, markers
- Text, **Work From Waste**, page 208

1. After participants read the text, **Work from Waste**, trainers lead discussion on what point of view the text promotes.
    - Is it positive or negative concerning waste recovery and scavenging?
    - Why is it positive?
    - Verify with participants Vogler's assumptions about the reasons waste provides work.
2. Discuss the negative aspects of scavenging. Some of these things might be:
    - unsanitary conditions
    - lack of protective clothing
    - breathing polluted air
    - lack of clean and safe water at the dump site
    - lack of medical care
    - lack of schooling for the children
    - possible hazardous wastes in the dump

It is important to acknowledge the negative aspects and conditions of scavenging but also to recognize that people earn a living off of waste, as Vogler points out. Discuss what would happen to those people who do earn a living if they were banned from the dump.

1. Discuss with participants some ideas for improving the conditions for scavengers at the dump. Some ideas might include:

   - establishing a health service at the dump site
   - requiring all users to separate recyclable items from solid waste beforehand (so that scavengers do not need to sort through all of the solid waste)
   - putting in a clean and safe water source at the dump for scavengers
   - controlling access to the dump in order to limit scavenging
   - controlling entry of materials into the dump
   - maintaining a sanitary landfill instead of a dump.

2. Discuss some ideas to remove the sought after items from the solid waste stream prior to entering the dump. Would this eliminate scavengers?

text

Work From Waste

by Jon Vogler

Waste is one of the world's largest industries, although you could not discover this from any book of statistics, because its activities cut across normal divisions into which industries are placed. If you buy a bottle of medicine it may have a metal top and be protected by plastic foam padding, in a cardboard box. To recycle these parts after the medicine has been taken you will need to sell the bottle to a glassmaker, the top to a foundry, the plastic to a moulder, and the cardboard to a paperboard mill. Recycled materials are only a small part of the materials used by most of those factories; yet add up all the bottles, tops, packaging, and cardboard cartons and you have an enormous quantity of material. Then add wastes from agriculture, animal and meat industries, mining and quarrying, industries that make iron and steel and other metals, textiles, rubber, chemicals, and oils and it is even bigger. Finally, include all the activities of local government in collecting and disposing of household and other wastes and the huge size of the industry becomes apparent.

Why, when employment is so difficult to create, should it be easier to do so in the waste business, an activity in which hundreds of thousands of people are already scratching a living? There are several reasons and they will be discussed in some detail. By persuading readers that waste offers unique opportunities for creating jobs, it is hoped to encourage them to read further and then to consider whether they can apply some of the ideas to their own business or to the group of poor people with whom they are working, or pass on the ideas or the book to others. This book is of no value until someone who was previously idle, one day uses it, finds work and earns money.

The reasons are these:

Waste is plentiful

Waste is free

Waste is flexible

Waste is labor-intensive

Waste needs little capital

Waste sells for cash

Waste is familiar

Recycling of waste is approved

(Vogler 1981, pp. x-xiii)

Solid Waste Management in Fragile Lands Session 27

Overview
Waste is generated in all places on the planet, including areas least able to support, treat or store solid waste. This session will explore aspects that make lands fragile and also propose ways to mitigate damage to the environment when managing solid waste.

Time: 1 hour

Objectives: Participants will:
1. Learn the characteristics of fragile lands and discover, if they are not already aware of it, that they are living on fragile land.
2. Gain knowledge of specific strategies they may employ to improve their solid waste management program in order to mitigate damage to their environment.

Resources
- Flip charts, markers
- Text, **Solid Waste Management in Fragile Lands**, on page 210

Trainers' Notes
If participants obviously do not live in a fragile environment, are not disposing of wastes in a fragile environment or have no control over the disposal of solid waste in fragile lands in their country, this session can be omitted.

Procedure

Participants read the text, and then discuss how solid waste management in their area might be impacted.

Some recommended questions:

- Are participants living in a fragile zone?
- What precautions can they describe as necessary to include in their solid waste management program?

text

Solid Waste Management in Fragile Lands

Fragile lands include coastal areas, island countries, desert areas, and riparian zones. These areas are considered fragile for reasons of their close proximity to surface or ground water, limited land availability, and soil composition.

Solid waste management in coastal areas requires particular attention to disposal sites where solid waste might contaminate ground water; usually very close to the surface. Contrary to belief, oceans cannot safely absorb wastes. Dumping of wastes or letting them wash out to sea causes pollution, kills and maims fish and other living sea creatures, and destroys the aesthetics of the beach and surrounding community. Riparian zones and island countries would experience similar negative results from dumping solid waste into the water.

Island countries have the additional challenge of incorporating a solid waste management system into a finite land mass. Programs aimed at recycling and reuse can decrease the amount of solid waste going into a solid waste depot. In order to maximize the use of valuable space, proper landfill management techniques are paramount.

In desert areas solid waste management is an issue because of the high conductability of sandy soil. Leachate from the solid waste could more easily contaminate surface water or ground water and surrounding soils. A dry environment where solid waste might be, or become more flammable, might suggest incineration as a solid waste management practice.

Generally, following recommended design and operation and maintenance guidelines for sanitary landfill, paying attention to siting, consideration of the proximity to surface and ground water sources, etc., will lead to minimization of negative environmental impacts. In addition, using the other methods recommended in this manual for community participation and involvement in solid waste management will formulate a sound policy.

Trouble-Shooting for Community-Based Solid Waste Management Session 28

Overview
Community-based initiatives can be very empowering in the exciting initial stages of planning and while the activity is working well. After some time, some problems may come up that easily could be the un-doing of the activity. This session will discuss some problems experienced on a community-based solid waste management project in Côte d'Ivoire.

Time: 1 hour

Objectives
Participants will gain knowledge of certain challenges a community-based activity might encounter and brainstorm possible solutions to avoid them or to mitigate them.

Resources
1. Flip charts, markers
2. Text, **Common Problems Experienced by Community-Based Solid Waste Management Workers**, on page 212

Trainers' Note
List the problems stated in the text on a flip chart prior to start of session.

1. Participants read the text, then discuss the problems, add any additional problems they foresee to the flip chart, and present ideas on how to avoid the problems.

2. Trainers ask the group to imagine that they are now involved in a community-based SWM program, where the leader of the group has been accused of mismanaging the accounts. A role play scenario may be constructed to work out the challenge, or participants can discuss how such a situation might be handled in their community.

Common Problems Experienced by Community-Based Solid Waste Management Workers

Community Relations

Education and awareness raising

Education of household members

How to communicate with clients

Financial Problems/ Problems with Equipment and Materials

Finances

Profits/remuneration for the trash collectors

Accountability in the accounting

Work materials

Personnel

High turnover

Quality of management/management style

Motivation of the community-based group

Communications among group members

System

Role of different people in the process

Responsibility of the group

Lesson Plans for Educators Section Seven

This section contains lesson plans that can be adapted to a variety of classroom situations for students of all levels, to acquaint them to the concepts of solid waste management.

Litter More Than a Passing Glance*

Materials

- A large wall plan of the school ground
- A large wall histogram (bar chart)

Procedure

1. Divide the class into groups, each to survey a particular area of the school ground. Each student then draws a plan of their respective area to take with her/him into the school ground.

2. All students go out and collect litter in their assigned area noting down on their plan exactly where each item of litter was found (e.g., under a tree, near a path or a seat).

   Assign symbols to each kind of litter. Examples:

Candy wrapper	★	Paper	⛌
Plastic	◆	Cans	▮

3. Each group should have a plan of their area with the litter marked on it. Transfer this information onto the class map.

4. Ask students to make a histogram/bar chart showing the number of each type of litter in their area.

5. Transfer this onto a large wall histogram. (This activity could be repeated either every day for a week or once a week for four/five weeks.) Student groups could stay in the same area or move to a different area of the school ground on each survey.

6. Discuss the practices that lead to littering. Ask students to suggest some solutions.

7. Show the Principal the results of the litter survey. Suggest plans of action about possibly reducing the litter problem of the school ground.

* Source: Environmental Education Teachers Manual, editors, Mairead Dunne and Neva Wendt, p. 94.

Waste Disposal*

Materials
Wall histogram

Procedure
1. Ask children in the class to make a record of what their families throw away in one week. They should sort the waste into types, like glass bottles, tins, paper, plastic wrappers, plastic containers, waste food.

2. The children should give weights (in grams) to each type. If no balances are available, these can be estimated or counted.

3. Plot a histogram of the findings on the whole class data. Discuss the results and their implications for waste disposal as a potential and growing problem. Aspects of health should be emphasized.

4. Ask the children:
   - Where does this waste go?
   - What problems are associated with its collection and storage?

5. Discuss possible ways of reducing the throw-away waste at home.

6. Lead pupil discussion onto methods of recycling, reuse, and traditional ways of packing food.

7. Write a conversation between two cockroaches about how they love it when humans pollute the environment.

* Source: Environmental Education Teachers Manual, editors, Mairead Dunne and Neva Wendt, p. 95.

Land Pollution*

Materials

- Worksheet (see example below) and pencils

Procedure

1. Identify two areas of land that are fairly similar, one of which is obviously polluted but the other is not.

2. Prepare the class for this short field trip with a worksheet. The following is one suggestion:

Location	Pollutants	Cause	Seriousness	Possible Action or Solution

3. Divide the class into groups. Each group should make observations and record them on the worksheet.

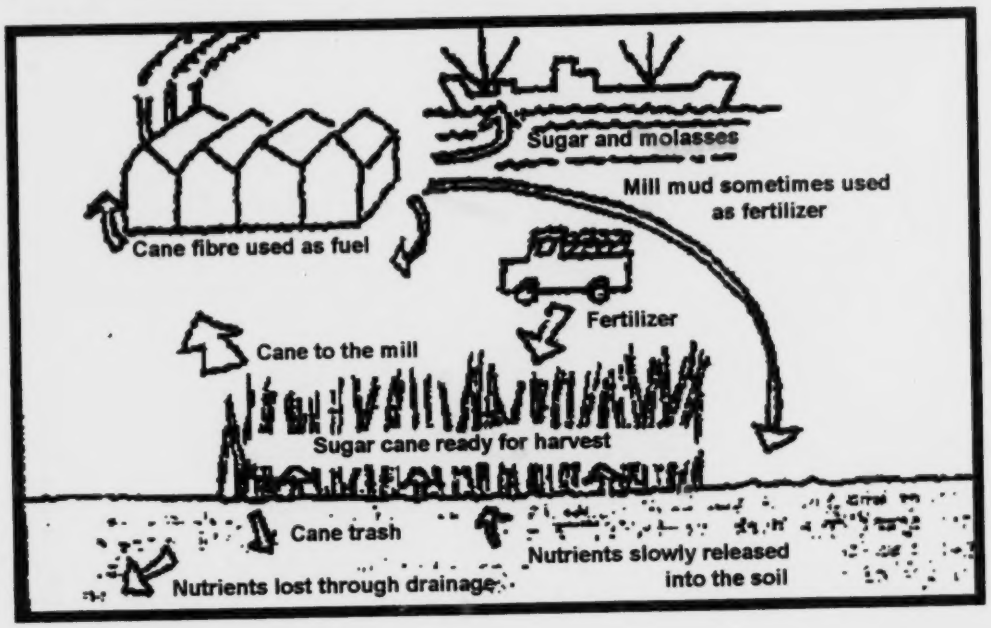
4. Discuss the pollution aspects on a whole class basis, with a view to any appropriate action. Perhaps require the children to carry out this action.

5. Over a period of a few days, have the children decorate a bulletin board to look like a polluted area. Encourage them to be imaginative—use real rubbish, or cutout shapes or magazine cut-outs. Don't forget the organisms—how would they feel? How would they look? After this is completed, get the class to clean up the polluted area by removing the rubbish.

* Source: Environmental Education Teachers Manual, editors, Mairead Dunne and Neva Wendt, p. 96.

Recycling*

Natural ecosystems usually have a high rate of recycling. As we have changed the environment to produce more of the things we want, the rate of recycling has been changed. The recycling of nutrients in a modern cane industry is shown below.


Sugar and molasses
Mill mud sometimes used as fertilizer
Cane fibre used as fuel
Fertilizer
Cane to the mill
Sugar cane ready for harvest
Cane trash
Nutrients slowly released into the soil
Nutrients lost through drainage

Nutrient Cycle on a Cane Farm
(Width of the arrows show the amount of nutrients moving)

Procedure

1. Visit a farm or garden and investigate all the ways in which recycling takes place. It would be good to include a subsistence farm, an improved subsistence farm, a modern farm, and also different levels of production.

2. Draw a diagram of what you find, like the one above.

* Source: Environmental Education Teachers Manual, editors, Mairead Dunne and Neva Wendt, p. 137.

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Key Mangrove Part One ... A System In Conflict*

Objectives
Identify ways in which people have changed wetlands. Identify the benefits or harm caused by changes to wetlands. Identify changes to wetlands as temporary or irreversible. Design a balanced plan for development

Ages: Intermediate, advanced
Subjects: Science, social studies
Materials: Four illustrated maps of Key Mangrove, found on pages 223-224.

These four maps depict changes that have occurred over a period of 30 years in a hypothetical wetlands area, Key Mangrove. Introduce the first map using the information given under *Change in a Mangrove Ecosystem*. All the changes that occurred in this wetland area over the 30-year period are listed for you, but allow your students the opportunity to discover the changes themselves.

A mangrove swamp offers just one example of a wetlands ecosystem. You may prefer to adapt this exercise to focus on other wetlands types, like prairie potholes or bogs, instead.

Procedure
1. Examine all four maps with your students. Use these questions to guide their observations and draw conclusions about the development that has taken place on the island:

   a. Look at the first map. About what percentage of Key Mangrove was covered by mangrove swamp 30 years ago?

   b. Look carefully at the development that has taken place at each 10-year interval. In each case,

      - How has transportation increased?
      - What industries have been added or expanded?

* Source: Environmental Education in the Schools: creating a program that works!, Peace Corps ICE, manual M0044, pp. 139-151, 276-286, 317-321, and 409-414.

- How has the residential development increased?
- What recreational facilities have been added?
- What public services have been added to meet the needs of the residential and industrial development?
- What have been the effects of the mangrove swamp on the key itself?
- Why is the swamp important?

c. Compare Map 1 with Map 4. What is the percentage of mangrove swamp that remains? (Divide the areas to be compared into grids, then calculate the percentages from the number of grids in each area.)

d. What percentage of the original mangrove swamp was filled in at each 10-year interval?

e. What was built first? How did this stimulate the rest of the development?

f. What has been the effect of this development on the wetlands and the animals living and breeding there?

g. Do you think the shrimp industry has been affected by the increase in development? In what way?

h. In what ways could people use the mangrove swamp in its natural state for recreation?

- In what ways have people altered the mangrove swamp for recreational purposes?
- How have the recreational uses of the island changed over time?

i. What immediate benefits are the result of development of the wetland?

- What are the long-term benefits of this development?
- Who or what has been adversely affected by the development of the wetlands?

j. Where could development have taken place on this island without destroying the mangroves?

- Why do you think more development didn't take place in these areas?

k. Do you think people who moved in 30 years after development began really know why the island was named Key Mangrove?

2. Now your students are ready to create their own management plans for the island using the first map as their starting point. Generally, their plans should allow for the orderly development of the island and the conservation of its natural features.

   a. Their plans must provide for human needs such as housing, food, schools, recreation, and waste disposal.

   b. Their plans must still protect the natural system, recognizing its aesthetic, economic, and ecological importance.

Summary

When students have completed their plans, share them as a class and use these questions to help them understand the process they used in developing their plans:

1. What development was not included in your plans? Why not?

2. Whose needs did you think were most important to consider as you developed your plan.

3. Did you have problems finding a balance between development and conservation?

4. Who do you think would object to your plan? Do you think their objections would be legitimate or would be raised simply to further their own interests?

5. Did you find cases in your planning processes in which the wishes of an individual or small group became more important than those of the whole group? In which cases?

6. What compromises did you make?

7. Look at the original maps. What changes would you make at each 10-year interval? Why?

Change In A Mangrove Ecosystem

You will notice that 30 years go the hypothetical island, Key Mangrove, was largely uninhabited. Only four vacation estates had been built on the island. Much of the area was covered by mangrove swamp.

Red mangrove, a tree species adapted to brackish or salty water, covers large portions of this type of swamp. These trees grow easily in water and can be recognized by their arching, stilt-like roots, which are at least partially responsible for the growth of the island itself. The roots trap materials carried by ocean currents and protect the accumulating land mass from ocean waves or hurricanes. The mangrove drops leaves that provide nutrients for the accumulating soil. These dropped leaves also provide habitat and food for the plentiful animal life, from invertebrates to fish, birds, and occasionally, mammals.

A mangrove swamp is a breeding area and habitat for many marine animals, especially shrimp. Many varieties of birds live and breed here. Herons, wood storks, and other wading birds nest here in great numbers. Mollusks, such as coon oysters and Florida hornshells, are in these swamps. Bonefish come in with the tide to feed on the crabs and mollusks living in the shallow water.

Because of the abundance of wildlife and marine life, Key Mangrove was a fisher's and seafood lover's paradise for years. Shrimpers from a coastal town on the mainland fished the waters of Key Mangrove and took their catch to a large packing firm on the mainland for processing. The mangrove swamp is a fragile ecosystem, and its basis, the red mangrove trees, may be affected by slight variations in salinity and in nutrients carried in the water.

Ten Years Later

- The ferry has been replaced by a bridge allowing easier access to the mainland.
- Some shrimpers have moved permanently to the island now that a bridge connects it to the mainland.
- A shrimp packing plant has been built.
- A housing development has been built that furnishes homes for the workers at the shrimp packing plant.
- A sewage treatment plant has been built.
- A supermarket and a drug store have been built on the island.

Twenty Years Later

- An oil company has built a refinery on the island.
- The shrimp packing industry has grown and more workers are needed.

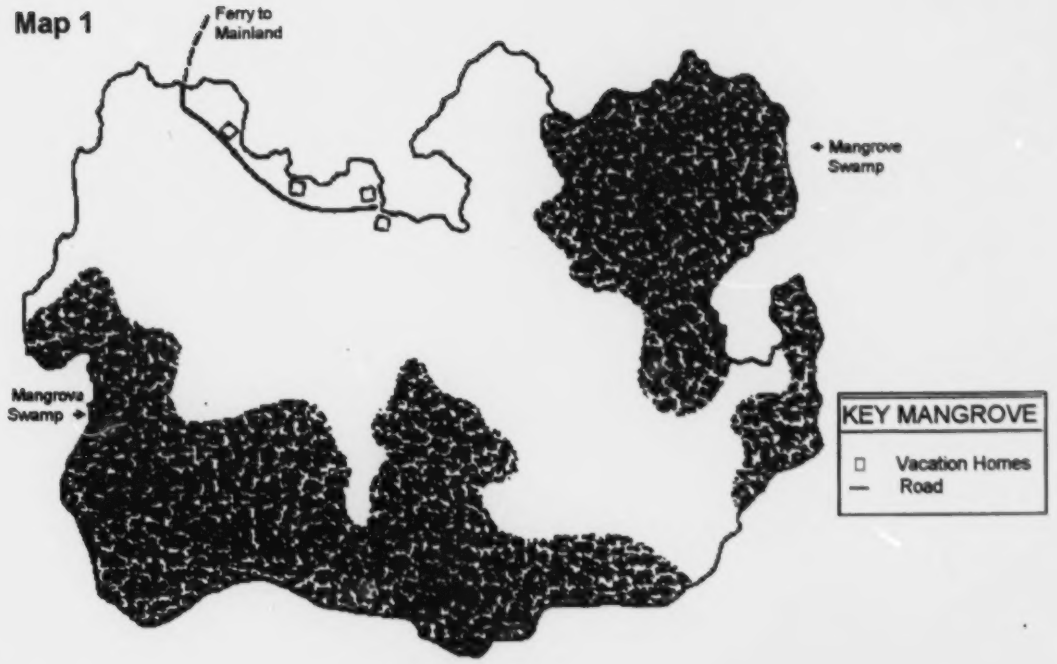
- A sanitary landfill has been established.
- More housing has been built for workers at the new plants.
- A shopping mall has been built.
- Two hotels and a marina have been built, increasing tourist trade.
- A school has been built near the new housing development.
- A golf course has been built.

Thirty Years Later

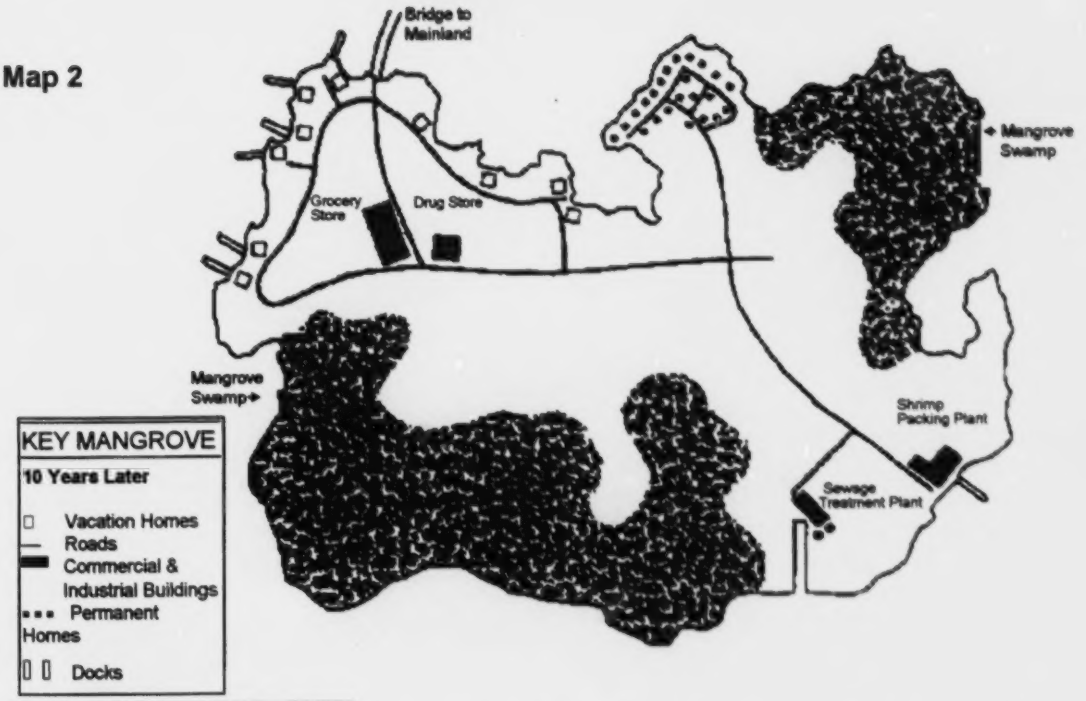
- Two more hotel complexes have been added and the area is becoming more popular as a vacation spot.
- A large public marina has been opened.
- Another golf course has been built on the eastern side of the island.
- The sanitary landfill has been enlarged.
- A housing development with boat ramps, attractive to sport fishers and water enthusiasts, has been built.
- Another school has been built to serve the growing population.
- A pond has been dredged on the golf course to attract migratory birds.

Changes in a Mangrove Ecosystem*

Map 1



Map 2



*Source: Environmental Education in the Schools: Creating a Program that Works!, Judy A. Braus and David Wood, pp. 144-145.

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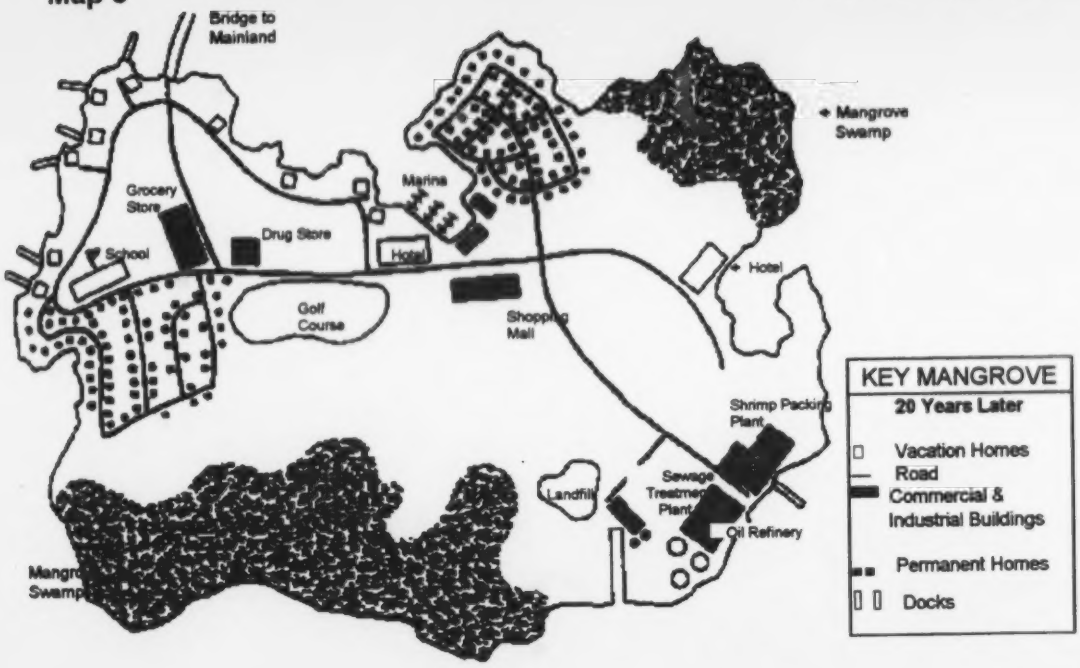
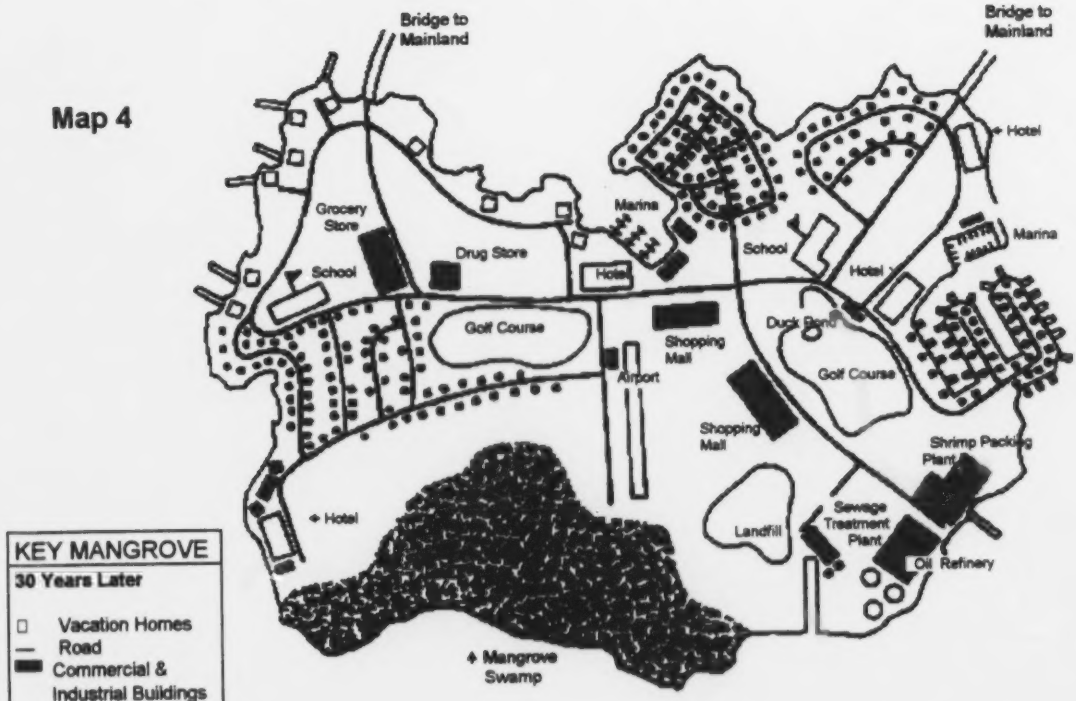
Map 3



Map 4



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Objectives
Identify the needs of individual residents concerning the mangrove swamp. Explore the problems associated with meeting the needs of all local residents. Design an island development plan that best meets the needs of the people and the environment.

Ages: Intermediate, advanced
Subjects: Science, social studies
Materials: Handout, Points of View, pages 228-231

Instructors' Notes
The Points Of View handout describes the feelings of Key Mangrove residents about the development that has taken place on their island and the possible development that will take place in the future.

Have several of your students present these points of view in a play to the rest of the class. The play could portray a town meeting, a rally, or a local newscast in which the residents are interviewed. This will prepare your class to analyze their plans from the viewpoints of the residents.

After the play, ask your class these questions:

- Do you think the plans you developed as part of the previous activity solve the problems you heard expressed in the play? How?
- Is it possible to solve all their problems?
- Which people seemed to have the interests of the entire group in mind? What did they say to convince you of that?
- Which people were expressing their own special interests? What did they say that made you feel that way?

Procedure
1. Divide your class into groups of six or eight. Give each group a copy of the points of view to help jog their memories.

2. Each group should now combine or revise their plans to make one plan that will best meet the needs of all the residents of Key Mangrove as outlined in the points of view. Their plan can be presented as a map, in a written essay, or as another play.

3. Now compare their new plans with the development that actually occurred as shown on maps of Key Mangrove on previous pages.

   a. Do students feel that growth on Key Mangrove was excessive?

   b. What could have been done to curb the growth?

   c. How does the development in their new plan differ from what actually happened on Key Mangrove?

4. If students feel that the growth on Key Mangrove was excessive, they should now write a series of regulations that would have ensured better use of the land.

   a. What restrictions would these regulations impose on homeowners? Industry? Recreation?

   b. Who would be responsible for policing and administering these regulations?

Summary

You may want to have each group present its new plan and new set of regulations to the rest of the class. Each plan could be critiqued and compared with the others.

1. Ask the groups to list the needs they considered (and the interest groups that expressed those needs) in order of the importance they assigned to those needs.

2. Were all the groups able to satisfy all the different points of view of the local people? If not, what was sacrificed? By whom?

3. Did all the groups sacrifice the same thing? Different things of equal or similar importance?*

4. How will the regulations work to benefit the people?

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* This question may bring up the difficulty of placing an economic value on certain recreational pursuits and aesthetic aspects of life. *How valuable is a sunset?* Allow your students to explore this for a while, and try to discover a way for the scenic value of an area to be measured against the economic value, if developed. Is this a fair issue? A fair measure?

5. What aspects of each group's plan benefited the entire community?

6. Have the opinions of each group or each student changed as a result of listening to each other critique the plans that have been designed?

   - How does this exercise relate to real-life situations?

   - How do you think compromise and/or decisions are reached in real-life situations?

POINTS OF VIEW

VACATION HOME OWNER 1
"I have been coming to this island for 15 years and I like it the way it is. I want complete peace and quiet on my vacation. I want to see wildlife and nature undisturbed by human activity. This island is one of the few remaining mangrove habitats for many different kinds of wildlife. Sure, we can destroy this swamp, but how do we know what is happening in other places? How can we make sure there is a place for our wildlife? I think it's about time we accepted our responsibility for the wildlife that has come to depend on us."

VACATION HOME OWNER 2
"On my vacation, I want to swim, boat, have fun with my friends—I like excitement and night life."

CHAMBER OF COMMERCE MEMBER 1
"My business depends on tourists and residents spending money in my department store. I am interested in developing this island in such a way that more people will live here and spend their money in my store. It is important to me to have industry, hotels, and housing developments. Without the people who use these facilities, I would go broke, and I have a family to support. This is my livelihood."

CHAMBER OF COMMERCE MEMBER 2
"My business depends on sports people. I sell fishing gear, boats, and sports equipment. I am interested in developing this island in such a way that people interested in these kinds of sports will visit it. Therefore, I don't want to see all of the swamp filled in and developed into golf courses, hotels, or airports. That will put me out of business. My business is to supply the sportsmen, hikers, and other visitors who just want to enjoy nature and to explore the island. These are the people I want to attract to the island."

HOTEL OWNERS REPRESENTATIVE
"I have a 500-room hotel which needs to be 70% filled in order for me to make a profit. You figure out how many rooms need to be filled for me to stay in business profitably. We need attractions for them. We need golf courses and marinas. We need landing docks and moorings for people who come in their own boats. We need parking lots and stores for these people. We need attractions that are going to make people want to take their vacations here at my resort. Therefore, we cannot afford to keep these swamps as they are. The swamp has mosquitoes and it smells bad. You can't swim in it and it is not going to attract people to my hotel. I suggest that we fill it in and build a new golf course. We could use another one."

AUDUBON SOCIETY MEMBER
"I am interested in wading birds and shore birds. If we can keep the swamps as they are and keep the mangrove trees, these birds will come to breed and raise their young. They are a very important part of our environment. If the swamp is destroyed we will lose many different kinds of birds, and the island people will lose the $3 million worth of business brought by people who want to visit the swamp. People like me take canoes and quietly observe birds and other animals and their habits, take photographs, and write about them. We can't do this if you destroy the swamp. I do not want to see this land developed."

SHRIMP PACKING PLANT OWNER
"My business depends on a plentiful supply of shrimp. We will not have these shellfish any longer if we continue destroying our mangrove swamps for hotel development, golf courses, private homes, private docks, and the roads and shops you people are planning. We can always put oil refineries and hotels somewhere else, but we can't put shrimp just anywhere. This is a $12 million business on this island! If we destroy the shrimp habitat, I will go broke. My plant will have to close and my employees will be out of work. Just think how high the unemployment rate will be! Then people won't have money to spend on local businesses."

PRESIDENT OF THE SHRIMP PACKERS UNION, LOCAL 461

"My people earn their living processing the shrimp that are caught off the shores of Key Mangrove. When I was first a member of this union, the shrimp boats used to bring in 80 tons of shrimp a day to be processed in the plant. We had 200 people working here. Since the bridge was built 20 years ago, more development has occurred and there have been fewer areas for the shrimp to grow. The number of people who work in the shrimp packing plant has been reduced to 100. A hundred people are out of work because of the development that has been allowed on this island. At this point people want to develop more of this land, to take away more of the shrimp habitat and the mangrove swamps. If you do this, you are going to put 100 more people out of work."

BIOLOGIST FOR THE FISH AND WILDLIFE SERVICE

"I have been sent here to study the organisms that live in and depend on the mangrove swamp. I have done extensive studies on shrimp, coon oysters, and bonefish, and I have found that these organisms would be eliminated if the mangroves are destroyed. The swamps are also an essential habitat during part of the life cycles of many other organisms. Destruction of these swamps would ensure destruction of many varieties of wildlife that depend on the swamps. Until we fully understand the importance of mangroves, we cannot afford to do anything that would destroy them. The shrimp and commercial fishing industries would also be destroyed along with local businesses that are supported by people who want to canoe and look for wildlife in the swamp. We could be creating more problems than we are solving if we destroy the swamps."

PERMANENT HOMEOWNER

"I spent a lot of money for my house. When I moved to this development on Key Mangrove, it was rather exclusive. We had a marina. Our homes were on the golf course. We had our own docks. We had all the advantages of privacy and yet all the conveniences of a resort hotel down the street with nice boutiques and shops where I could take my guests when they came on the weekends. There was not much traffic and our property was increasing in value because of the type of development here. Since that time an oil refinery has moved in. We have an airport. The development is encroaching on our privacy. More and more people are coming to the island and causing traffic problems and pollution. I just wonder if our land values are going to be maintained if we allow any more of this kind of development. I don't want to see any more industry or anything that will detract from its exclusive aspects."

OIL REFINERY MANAGER

"When we built our refinery here, I was told there would be plenty of facilities for my workers, that there would be places for their families to live, and that I would have no trouble finding people to work here because of the location. We need more low-cost housing for our employees, and I want to see that dirty old swamp—that smells worse than any oil refinery ever did—filled in. And I want to see homes and facilities built there for the people who are going to work in my plant. Otherwise, we are going to have to close and find a place that will take us.

Now that I am here in operation, I find there are a lot of environmentalists, bird-watchers, and people who like to fish and hunt, but they don't have any consideration at all for the person who has to earn a living by working here. They don't consider the fact that in order for them to enjoy their activities, they need somebody to refine the oil for their powerboats, trucks, and cars."

BANK PRESIDENT

"Well, I think we need to have a bit of rational talk around here. I find that an awful lot of my customers are sitting here in this room today. Obviously you all have different interests, but you do have three things in common: you all need to earn a living, and you all need a place to live, and places to buy goods and services. My job is to run the bank, to give you services that allow you to do all the things each and every one of you wants to do. Now, when it comes down to the bottom line, you've got to be practical. In order to feed your kids and get the luxuries in life that you all seem to want, you're going to have to have industry, you're going to have to have business, and you're going to have to take some of these unpleasant lands and develop them. Now, it's not a matter of sentiment, and it's not a matter of those nice birds, nice animals that live there in the mangrove swamp. It's a matter of dollars and cents and your livelihood. I suggest that we all sit down and get together and decide that we are going to do something that is going to keep your bank operating for you people who need the money that it generates."

Infusion Activity For Environmental Health

Objectives
Identify problem oriented environmental and health issues associated with solid waste management issues. Identify solutions to solid waste management issues. Create an issue web showing the relationship between health and environmental issues.

Ages: Advanced
Subjects: Health, science
Materials: Handout, Issue Webbing*, on page 235, chalkboard, chalk

Instructors' Notes
There are several productive ways of organizing this activity. Regardless of the sequence used, teachers should engage students in brainstorming, issue investigation (i.e., using secondary sources), and synthesizing results. The handout on page 236 represents one way of introducing students to *issue webbing*.

This sequence consists of five parts. Prior to beginning the activity, teachers should be prepared to expose students to a partially completed web (e.g., the issue webbing example found in this activity, or an example of their own design) on an individual basis (e.g., individual worksheets) and on a collective basis (e.g., blackboard, newsprint, or posterboard).

Procedure
1. Teachers should begin the activity by illustrating the complexity of many environmental health issues (i.e., large issues that often subsume a number of smaller, interrelated component issues).

During this introduction, teachers may need to:

- clarify what an issue is
- suggest that parties may be at issue over:
  - one or more problems
  - one or more alternative solutions
  - or some combination of problems and solutions

* Source: Environmental Education in the Schools: Creating a Program that Works!, Judy A. Braus and David Woods, p. 279.

It may also be useful to help students differentiate between environmental and human health issues that comprise larger, complex environmental health issues.

2. Once the teacher senses that students comprehend these aspects of environmental health issues, they should be introduced to the solid waste management issue. The class should be presented with the large, collective representation of the partially completed web for that issue.

The webbing format should be briefly described, including the four quadrants of the web. The teacher should then engage in two brainstorming sessions.

During the first session, students are asked to suggest adding to, modifying, or deleting from the partially completed environmental side of the web. Students may not modify or delete other students' suggestions, only parts of the partially completed web provided by the teacher.

Students' suggestions should be recorded on a separate list. When the list is complete, items on the list are open to discussion, and if agreed upon, to inclusion in the larger, collective web. While some attention must be paid to relationships among problem- and solution-oriented issues, the emphasis should be upon developing the basic structure of the web. This will be attended to in greater detail in the last part of the activity

Once students are relatively comfortable with the environmental side of the issue web, the teacher should oversee a second brainstorming session for the human health side of the issue web. Follow the same procedures as before.

3. The third part of the activity focuses on the improvement and expansion of the issue web using the recommendations of the class.

    - Students should be organized into small groups, and assigned one quadrant of the web, such as solid waste-related human health solutions.

        - It is their task to review secondary source materials that provide information about issues that fall within their quadrant.

        - On the basis of their findings, groups are asked to add to, modify, and/or delete items from their quadrant of the web.

        - They may also be encouraged to keep notes about relevant issues that fall in other quadrants, and about relationships issues between quadrants.

4. During the fourth part of the activity, each group will be asked to report back to the whole class the results of their reviews. Each group will have the chance to

present and discuss the modifications made to their part of the web. Members of other groups may ask for clarification, or on the basis of their own review, provide additional insight into the proposed changes in the web.

Disagreements about the inclusion/exclusion of any component issue may be resolved in several ways:

- If the disagreement appears to be information-based, students should be encouraged to provide information to substantiate their view. This may require additional investigation.

- If the disagreement appears to be based on other beliefs or values, the issue(s) in question should be tentatively incorporated into the web, to avoid irreconcilable disagreements or rifts in the class.

At this point, the class will have pieced together a detailed graphic representation of the environmental and health issues, that comprise their larger issue.

5. The final part of this activity asks students to discuss relationships among these issues (e.g., contributing causes and effects), and to depict these relationships as part of the web. They may use solid, dotted, or colored lines to depict the various types of relationships they identify. The same rules that applied to modification disagreements may also be applied here.

When the webbing is complete, the teacher should ask students to reflect upon the process and upon the results of their efforts.

Terminology

Several terms are used in this activity that may require definition or clarification by the teacher. For the purpose of this activity, these terms and their intended meanings include:

Environmental: primarily used in reference to natural ecological conditions (e.g., species populations and their habitats, air and water, soil and rock layers, ecosystems)

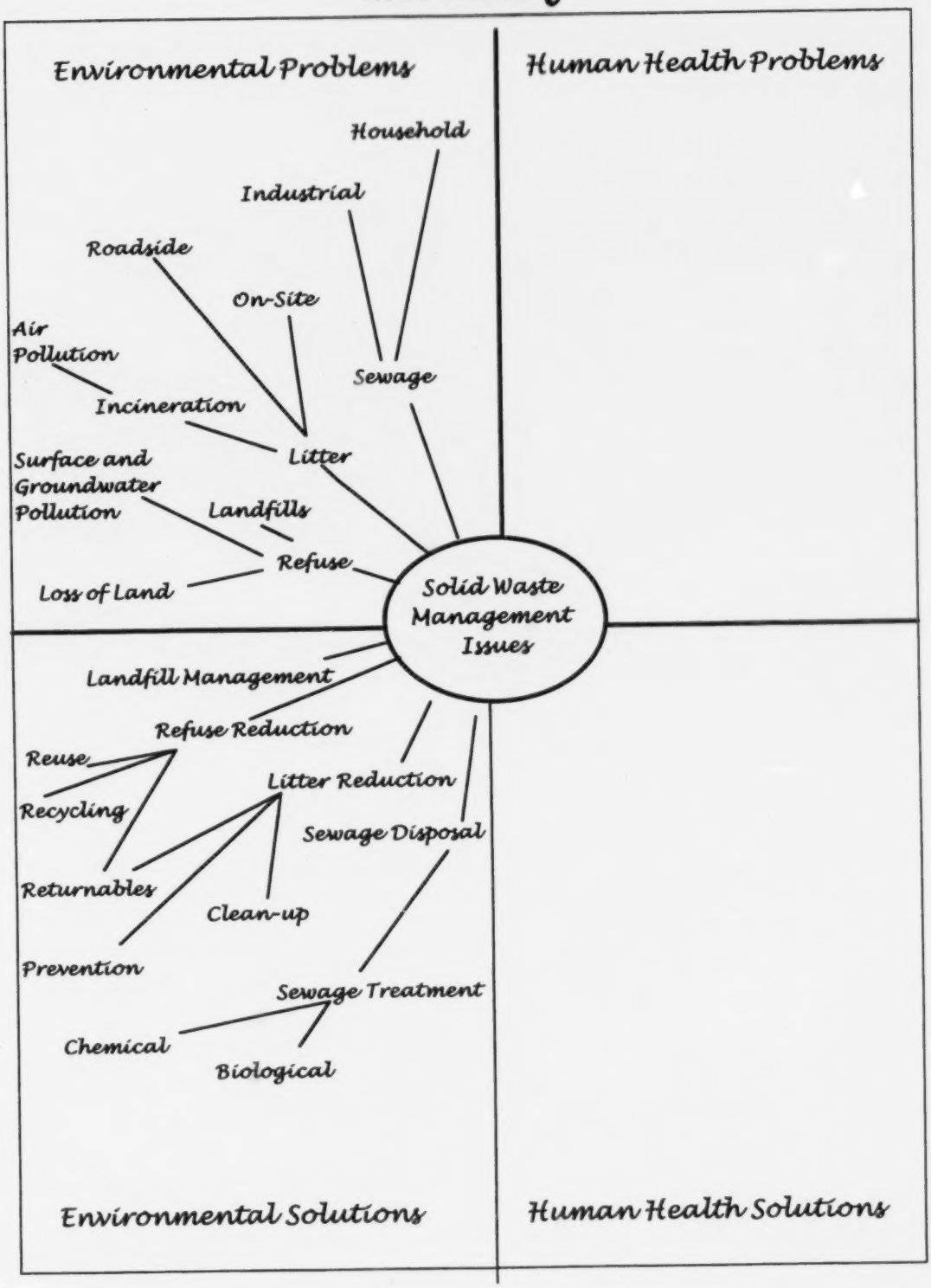
Health: primarily used in reference to human physical/ physiological conditions (e.g., skin, intestinal, respiratory conditions)

Problem: primarily used in reference to perceived adverse impacts of (i.e., causes) or perceived adverse impacts from (i.e., effects) some biophysical condition or conditions (e.g., the ecological and human respiratory effects of exposure to differing types of air pollution)

Solution: primarily used in reference to alternative actions that may be taken in an attempt to curtail such adverse impacts, or to reverse the negative effects of those impacts

Issues: primarily used in reference to problems and/or solutions on which human beings (i.e., as individuals or as groups take differing positions, and in reference to positions which they support or defend by using differing rationales).

Issue Webbing



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Field Trips

A quiet lake. A poorly planned city. An overgrown field. An eroded stream bank. The local landfill. A recently deforested lot. Some of the most effective learning takes place outside the classroom. By taking your students on field trips, you can give them first hand experiences with natural resource and pollution issues, community resources, career opportunities, and other environmentally-related topics. But before walking out the door with your students, it's important that you do your homework. Here are some field trip tips and tricks:

- Have one or more definite field trip tasks lined up. This will focus your students' attention on specific goals and maximize the value of the learning experience.
- Outline your objectives well in advance of the field trip, and tie the experience to your learning objectives.
- Make sure to get permission from landowners, government officials, and others before taking students to a site.
- If possible, visit the site a week or so before you take the trip so that you know exactly what to expect. Make notes of any potential safety problems, such as slippery hills, deep water, or poisonous plants.
- Make sure to let students know what to wear and bring on the field trip, and make sure to get parental and school administration permission.

Research in the United States and other countries has shown that outdoor field trips and experiences can increase knowledge, skills, and understanding of concepts especially with average and below-average students. Many studies also indicate that outdoor experiences can help increase a person's interest in, and appreciation of, the environment by providing first hand, concrete, and personal experiences; they can also help students develop positive attitudes toward science.

It's important to realize that outdoor experiences can take place anywhere—in urban areas looking at the built environment, in fields and forests nearby, in the local landfill or waste water treatment plant, or at a community zoo, museum, arboretum, or nature center.

There are two sample worksheets that students could take along on a field trip to a local landfill or dump to focus their activities while they're at the site—one for primary students and one for secondary students. A list of some generic activities that can take place at the beach also follows.

At The Dump And Postcards From The Field

Here's a sample worksheet that students could take along on a field trip to a local landfill or dump to focus their activities while they're at the site.

At The Dump

I. List the ten most common items that you see in the dump:

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

2. Put a check beside the items that you threw away last month.

3. Circle the items that could have been reused or recycled.

4. How does the dump affect:
   a. the amount of land in the community?
   b. the people who live nearby?
   c. nearby streams or rivers?

5. As the number of people increases, what are your recommendations for dealing with more garbage?

Post Cards From The Field

Here is a follow-up activity to a field trip that stresses art and writing. Ask students to send a postcard to a friend describing a recent field trip. Have them draw a picture showing something they saw or learned about on the field trip. Then have them write about their experiences in the second box.

The Garbage Dump Field Trip Worksheet

Date: _____ Your name: _____

1. Identify, in writing, the location of the dump.
   - What is the size of the dump site in acres or hectares?

2. How do people living in the surrounding areas use this dumping area as a waste disposal site? (Included should be a list of the major kinds of waste observed here.)

3. Dumps can be classified as sanitary landfills, rubbish burning dumps, or open dumps. Into which category does this dump fit? Why?

4. Is this a legal dumping area?
   - Does it conform to the legal statutes governing waste disposal?

5. Is there any evidence that animals inhabit the dump?
   - If so, what kinds of animals?
   - Do they appear to present health and/or safety problems?

6. Briefly describe the uses of the land areas immediately adjacent to the dump property.
   - Are they residential, farm land, other?
   - What would property values be adjacent to the dump?
   - What kinds of problems does the dump present to area land owners?

7. Are there any waterways within or near the dump site?
   - Do they receive run-off water from the dump?
   - If so, what problems might this cause for surrounding communities?

8. Is there evidence of pollution in the dump area? (Consider air, noise, and visual pollution.)

9. How long can the surrounding area rely on the present disposal site?
   - What are the future plans for waste disposal in this area?

10. Are there alternatives to dumping for the people who are using this dump? If so, what are they?

11. Can this disposal site be reclaimed? If so, how should this be done?
    - Are there legal restrictions/regulations governing reclamation of garbage dumps?

12. What could your class do to attempt to remedy potential/actual problems in this situation?
    - In the case of illegal dumping, should you/your class get involved in this type of controversy? Why?

The Urban Explosion

- According to the United Nations, by the year 2025, the world population will climb to more than 8.2 billion. And most of the increase will take place in urban areas. Many experts anticipate that the urban explosion will:

- Take place at proportionately higher rates in developing country urban populations

- Take place throughout urban areas, from market towns to megacities

- Shift the location of poverty from rural to urban areas. (By early next century, more than 57% of the world's poor will be living in cities.)

- Increase urban environmental problems throughout the world, including increased air and water pollution, solid and toxic waste disposal problems, traffic congestion, noise pollution, and other serious problems.

Four Urban Activities

Objectives
Investigate urban environmental issues (See each activity for specific objectives.)

Ages: All
Subjects: Social studies
Materials: See each activity for materials

The following four activities focus on investigating urban communities and urban environmental problems. Adapt the activities to fit the needs of your students and community.

Micro Urban Investigation

Emphasis: Community inventory and reporting
Time: Several days
Materials: Map of the city, poster paper, and local newspapers

Objectives
List positive environmental qualities of a neighborhood or part of the local community. List negative environmental qualities of the area. Explain verbally how positive and negative aspects of an area affect the rest of the city.

Procedure
1. Visit a neighborhood or small part of the local community. Inventory the area:

   a. Determine what kinds of people live in the area. Note signs of children and types of housing (single-family homes, apartments, two-family homes, etc.).

   b. Types of businesses, parks, vacant land, construction, etc., in the area.

   c. List the positive aspects of the neighborhoods, both physical and visual.

   d. List the negative aspects of the environment, physical and visual. Pay attention to traffic congestion, decaying housing, quality of yards and streets, litter, etc.

2. Prepare a presentation or write a full report discussing the living environment of the study area. Consider the following:

   a) What are the neighborhood's positive and negative aspects?

   b) How do the positive aspects affect the rest of the community?

   c) How do the negative aspects affect the rest of the community?

   d) Which environmental assets have potential for serving as building blocks to improve the livability of this community?

   e) What problems exist because of other factors in the community?

   f) What environmental problems in this community are related to regional environmental problems?

3. Make charts and drawings of alternative uses of buildings or land in the area. Cut ads designed to sell or rent housing in the community (in the area selected if possible) and create a large collage of the ads for display.

4. Using the report and the visuals, prepare a report of major concerns about the study area. Determine an audience that might be interested in the report. Consider a government agency, a community, or church leaders. Make a presentation to the group to point out environmental improvements that could be made in the study area.

Brainstorming On Environmental Topics

Emphasis: Developing alternative solutions
Time: 30 minutes
Materials: List of brainstorming topics, chart paper, and markers

Objectives
Generate, in writing, alternatives to a community environmental problem. Evaluate, by discussing with a group, suggested alternatives related to the environmental issue being discussed.

Procedure
1. Form the class into groups of four or five.

2. Provide each group with a problem area about which to generate alternative solutions.

3. Possible problem areas (if appropriate for the local area):

   a. Urban housing
   b. Community recreation facilities and programs
   c. Solid waste management (school, community, home)
   d. Urban mass transportation
   e. Community water quality.

4. Provide each group with chart paper and markers to record the alternatives generated.

5. Give each group 20 minutes to develop alternatives. One member of the group records the alternatives.

6. The recorders of each group share with the other groups their list of alternatives.

7. During the sharing-activity additional alternatives can be added to each group's list.

8. Discussion questions:

   a. How realistic were the alternatives generated by your group to the topic area of discussion?

   b. How might the group have functioned more effectively?

   c. Were there any new strategies gained by sharing your group's alternatives with the rest of the class?

Deciding If You Agree Or Disagree

Emphasis: Values clarification
Time: 20-30 minutes
Materials: Five chairs or desks

Objectives
Discuss how individuals have different ideas about the nature of environmental problems. Discuss how individuals and different agencies have different ideas about the importance of environmental problems and methods of solving them.

Procedure
1. Arrange five chairs or desks in a row, leaving several feet in between them so as to form four separate areas along a line. These chairs represent positions ranging from agreement to disagreement. Explain to the class that you are going

to read several value-related statements for which they are to respond by walking to the area that represents their position on the statements.

2. After each question, have a few students share their reasons for the particular positions.

3. Continue this same procedure for other statements.

4. Let the class or yourself suggest other value statements.

The Urban Environment And Poor Neighborhoods

Emphasis: Community exploration and awareness
Time: Several days
Materials: Map of the metropolitan area (for each student if possible); paper and pencil

Objectives
Describe, in writing, ways the poorest people in the city are affected by environmental degradation. Discuss problems which result in the poor being ineffective in correcting environmental problems.

Procedure
1. On a map of the metropolitan area mark the location of four undesirable living areas, including areas where industries or other enterprises affect the quality of the environment, such as a steel mill, auto plant, sewage treatment plant, etc. (The telephone book might assist in finding them.)

2. For each area list all the disadvantages of living there, particularly the disadvantages of living close to the industries or plants.

3. For each area determine the type of housing. Indicate whether housing is single, two-family, or multiple-family dwellings. You can visit the areas or ask someone familiar with the area.

4. Mark the areas and industries on a large map.

5. Discuss the type of housing and disadvantages of living near each location.

6. Write a paper discussing the following questions:

    a. Why do people live near industries or other enterprises that might affect the quality of their lives?

    b. What economic segment of the population generally lives in the locations identified?

c. What educational level is generally found in this group of people?

d. Why are these people limited in the ways they can improve the quality of their lives?

e. In what ways do these people pay a greater cost than others living farther away from these offending industries?

f. What are some possible ways the quality of life in these areas can be improved?

7. Develop a plan to upgrade one area. Make a presentation on your idea to the class.

Science/Technology/Society

From genetically engineered microbes to nuclear energy to supersonic flight, technology has changed the world. We can now tinker with the weather, fax information around the world, and get a new heart. But what are the tradeoffs associated with new technology? Is nuclear power the answer to our energy shortages? Are pesticides and large scale farming the answer to the world's hunger problem? Many of the technological advances we've achieved have a price tag, and our students will be the ones that have to deal with the choices we make today.

In many parts of the world, there is a growing movement to help students understand the connection between science and technology. In some areas, this emphasis is dubbed STS—Science, Technology, and Society. In other areas, it's called STE—Science, Technology, and the Environment. Regardless of the acronym, the connection between science and technology is an important and integral part of environmental education. Every technological advance has an environmental consequence—from using scarce resources to polluting ecosystems, and it's important for students to see that connection. It's also important that students understand that all decisions involve tradeoffs. By incorporating activities that focus on the connections between science, technology, and the environment, you can help students understand the complex problems they will be facing in the future and help them learn how to make effective and just decisions.

We've included two activities in this section. The first looks at the advantages and disadvantages of current technologies. And the second looks at issues involving genetic engineering.

Challenge Technology*

Objectives
Define technology. Describe some advantages and disadvantages of current technologies. Identify some careers associated with pollution prevention and cleanup.

Ages: Intermediate
Subjects: Science, social studies, art

* Reprinted with permission from *Ranger Rick's NatureScope: Pollution—Problems and Solutions* published by the National Wildlife Federation (1990).

Materials

- Handout, **Technology Challenges**, on page 248
- Handout, **Pollution Fighting Technologies**, on page 249
- Drawing paper, and crayons or markers

Procedure

Here's an activity that will encourage your students to think about the advantages and disadvantages of some of today's technologies.

Begin by asking someone to explain what the word *technology* means.

Discuss their ideas, and then explain that technology is the application of science to solve problems.

Have the students brainstorm some examples of modern technologies (cars, power plants, genetic engineering, computers).

Point out that although technological advances have helped make life easier in many ways, they've also introduced new problems. For example, cars provide people with personal freedom, and they've made it possible to travel long distances in relatively short periods of time. But cars create problems too. Ask someone to describe problems associated with cars (cause air pollution; result in human death and injury; require the building of roads, which destroys habitats).

Explain that people are just discovering how some of the technologies we've created can harm the environment. For example, many scientists believe that acid rain, caused by pollutants released from coal-burning power plants and motor vehicles, is affecting the health of forests and lakes in some areas.

Talk briefly about how some people are working to improve existing technologies and to develop new technologies that can help solve some of our environmental problems.

Explain that the kids will be getting a chance to invent their own pollution-solving technologies.

Give each person a copy of the handout, **Technology Challenges**. Explain that the information describes some problems associated with different forms of technology that we use today.

Divide the group into six teams and assign each team one of the challenges.

- Have each team read about their assigned technology and then brainstorm some ideas to address their challenge. The ideas they come up with can include improvements on the current technology, or they can be

entirely new types of technology. Emphasize that there are no right or wrong answers to the challenges and encourage the students to think as creatively as possible. Also have them illustrate their solutions and write down a few sentences that explain how they work.

- When everyone has finished, have each team present its solutions to the rest of the group.

- Encourage the audience to ask questions and offer comments after each presentation. If a new kind of technology is presented, discuss how it might introduce new pollution problems.

- Have the group consider other solutions to their challenge. For example, instead of making new types of cars that don't pollute as much, it might be better to design a city where people don't have to travel so far every day.

Next pass out a copy of **Pollution-Fighting Technologies** to each person, and have them read about some real solutions to existing pollution problems.

Have them think about the advantages and disadvantages of each one. Then discuss the following questions as a group:

1. Do you think we can rely on new technologies to solve all our pollution problems? Why or why not? (Answers will vary. Point out that new technologies often introduce new pollution problems and, in some cases, act as "Band-Aids" to temporarily deal with problems without addressing the real solutions.)

2. Are there ways to solve pollution problems without developing new technologies? (Yes. People can change their behaviors. For example, people can cut down on the amount they drive by using public transportation or by riding their bikes more often.)

3. Do you think we really need all the technologies we have? Why or why not?

4. What kinds of professions might be involved in finding solutions to pollution?

TECHNOLOGY CHALLENGES

Toxic Roads. During the winter, snow and ice can build up on roads, making it dangerous for people to drive. Snow-plowing removes only some of the snow and ice, so a special kind of salt is also spread on many of the roads to melt the rest. But when the snow and ice melt, the salty water runs off into lakes, rivers, streams, and other waterways. This salty run-off can kill fish and other animals, affect the growth of plants, and contaminate drinking water. **Your Challenge:** Invent a better way to make roads safe for travel during snowy winters.

Traffic Troubles. In many cities, cars are the major means of transportation. They're also one of the major causes of air pollution. With so many people driving their cars every day, there's a lot of air pollution created by the cars while they're stuck in traffic. **Your Challenge:** Invent a better form of transportation.

Pesty Poisons. Many farmers use pesticides to kill insects that damage their crops. Unfortunately, these pesticides often harm birds and other animals. Pesticides also contaminate water supplies. **Your Challenge:** Invent a better way to control pests.

Overdoing It. To keep fruit from being damaged during shipping, it's often placed on plastic foam trays and then wrapped in more plastic. But when the plastic is thrown away, it ends up in landfills that are already overflowing with garbage. And many toxic byproducts are created when plastic is manufactured. **Your Challenge:** Invent a better way to package fruit to keep it from being damaged during shipping.

Don't Be Fuel-ish. Many power plants burn coal or oil to produce electricity. But burning these fuels results in air pollution. And getting these fuels out of the ground damages wildlife habitat. Natural areas can also be affected by accidents that occur when oil is being transported. **Your Challenge:** Come up with a less polluting way to create energy.

Danger Indoors. In an effort to cut down on the energy needed to heat and cool buildings, many modern buildings have been designed to be as airtight as possible. But many pollutants can accumulate inside these closed buildings. (These pollutants are released by sources such as copy machines, cigarette smoke, new furniture, and cleaning chemicals.) In fact, the air pollution inside some buildings is much worse than it is outside! This indoor air pollution has made some workers sick. **Your Challenge:** Invent a way to reduce indoor air pollution without increasing the amount of energy used to heat and cool a building.

handout

POLLUTION FIGHTING TECHNOLOGIES

Super Bulbs: Energy-efficient, compact fluorescent bulbs use one quarter of the energy of standard incandescent bulbs, and they last up to 10 times longer. By decreasing the demand for electricity, these bulbs, can help reduce air pollution. But compact fluorescent bulbs are more expensive than incandescent bulbs, and they come only in lower wattage's.

Goop Gobblers: Scientists have discovered strains of bacteria that feed on oil and other toxic pollutants. Bacteria have been used to clean up chemical spills and agricultural runoff. But sometimes the bacteria work too slowly—or not at all. And some scientists are concerned that introducing bacteria into areas where they aren't naturally found may disrupt local ecosystems.

Philodendron Filters: Scientists have discovered that common household plants such as *Philodendrons,* spider plants, and gerbera daisies can absorb some indoor air pollutants.

Bug-Vac: In California, some strawberry growers are experimenting with a safer alternative to pesticides. By attaching a giant vacuum, called a *Bug-Vac*, to their tractors, they can suck bugs off their crops without damaging the fruit—and without using pesticides that can poison other animals and contaminate water supplies. But the *Bug-Vac* also removes some insects that don't harm crops.

Wave Catchers: A floating device called the SEA Clam captures wave energy in the sea. Waves press against SEA Clam's air bags, squeezing air through a valve and into a chamber where it spins a turbine that generates electricity. The SEA Clam equipment is expensive and can be used only in areas that have suitable waves.

Wacky Windmills: Modern windmills have been specially designed to efficiently catch the wind and use it to produce electricity. Wind-generated electricity doesn't create air pollution, but it's sometimes more expensive and less reliable than electricity produced by burning fossil fuels. (New turbine designs and blade shapes may make them more efficient in the future.) Some people complain that windmills ruin scenic areas.

Sun-Mobiles: Instead of burning gasoline and polluting the air, solar-powered cars capture and use the energy from sunlight. Solar cells mounted on the cars turn this energy into electricity. On cloudy days, drivers keep their cars going by using extra energy from sunnier days that's stored in the car's battery. Currently, solar cars are expensive to manufacture and don't go as fast as gasoline powered cars.

Smoke Scrubbers: In some coal-burning power plants, machines called *wet scrubbers* spray lime and water into smoke entering the smokestacks, rinsing out sulfur dioxide (a pollutant that causes acid rain) before it leaves the smokestack. This keeps most of the sulfur dioxide from getting into the air, but can leave a toxic sludge that must be disposed of.

Coming to Terms with Marine Debris*

Objective
To define marine debris and to learn the types and amounts of marine debris found each year in national beach cleanups in the United States.

Activity
Students bring in different trash items and define marine debris through a discussion about these items. Students then categorize debris and use statistics and graphing to better understand the types and amounts of marine debris that are found each year.

Subjects:	Language arts, mathematics, science
Learning Skills:	Analyzing, calculating, classifying, collecting data, observing
Time:	40 minutes
Vocabulary:	Debris, foamed plastic, marine, marine debris, trash

Resources
- Handout, 1991 Beach Cleanup Results, on page 252 (modified to reflect your circumstances)
- A large box

Procedure
1. Ask every student to bring in a nonfood piece of trash. Tell students to be sure that the trash is clean and dry, does not have food stuck to it, and is not sharp. (Note: To prevent accidents, you may wish to tell students not to bring in glass. Instead, you can bring in a few glass articles so that the discussion of debris will be complete.)

2. Have each student bring his or her piece of trash to the front of the room, display it to the class, and put it in the large box. Ask the students what these items have in common. Throughout this discussion, identify the characteristics of *trash,* and develop a definition. Write the definition on the board. Then ask your class to think of synonyms for *trash*, and to define *debris*. List all the synonyms on the board, along with the definition of *debris*.

3. Now that *debris* has been defined, ask students what *marine* means. Write the definition on the board. Ask the students to list synonyms for *marine* and write them on the board.

* Source: EPA, Turning the Tide on Trash, EPA 842-B-92-003, Fall 1992, pp. 8-9, 12-13, and 15-16.

4. Then combine the terms and discuss the meaning of *marine debris*. Write this definition on the board. Use the lists of synonyms to come up with other terms that describe the concept of *marine debris* (such as *sea trash* and *ocean waste*).

5. Take the pieces of trash out of the box one by one and ask the students to classify the type of debris they are (plastic, glass, metal, etc.).

6. Distribute the 1991 Beach Cleanup Results handouts to the class. Inform the students that the Center for Marine Conservation (CMC) sponsors beach cleanup campaigns all over the country. Explain that volunteers record the items they find when they clean up beaches and send this information to CMC, which compiles these lists every year.

7. Ask the students to use the handout in making a bar graph comparing the quantities of the different types of debris (plastic, glass, metal, etc.) collected in the cleanup. Have the students add the total number of plastic items, the total number of glass items, etc., to complete the handout. (Note: If students have difficulty adding such a long list of numbers, you can give them the totals: 3,464,216 plastic items; 495,083 glass items; 98,879 rubber items; 504,063 metal items; 472,711 paper items; 122,384 wood items; and 53,405 cloth items.)

8. Next, have students label the horizontal axis of the bar graph as *category of marine debris* and write the different categories under the horizontal axis in an evenly spaced manner. Have the students label the vertical axis *number of items collected* and mark the axis from 0 to 3,000,000. Finally, tell the students to use the totals from the handout to complete the bar graph. (Note: As a class, you can create a three-dimensional bulletin board to display the bar graph. After drawing the bar graph on a large piece of paper, tack the paper to the bulletin board. Then glue or tape examples of the types of trash represented by the bar graph around it.)

Another option for illustrating the relative quantities of marine debris types is to have the students calculate the percentage each category represents. First, have the students find the grand total of items collected in 1991 by adding all the categories together. Then have students derive the percentage each marine debris category represents by using this total and the totals for each category. Finally, discuss with students which categories of marine debris are most common.

Other Directions

As a class, conduct your own cleanup activity at a seashore, lake, pond, stream, or river. Have students record the types and numbers of debris they find and compile a list similar to the 1991 Beach Cleanup Results handout. Be sure the items you collect in the cleanup are recycled or properly disposed of. Also, you could clean up the same area periodically and compare the quantity of debris collected each time.

handout

1991 Beach Cleanup Results*

Plastic	
Bags	347,263
Bottles	240,143
Buckets	10,335
Buoys	16,096
Caps/lids	212,852
Cigarette butts	940,430
Cups/utensils	
hard plastic	128,597
foamed plastic	125,008
Diapers	12,686
Egg cartons	8,605
Fast-food containers	31,856
Fishing line	36,124
Fishing nets	9,496
Floats/lures	13,381
Foamed plastic packaging	44,025
Foamed plastic plates	23,729
Hard hats	1,777
Light sticks	16,020
Meat trays	16,532
Pieces	
hard plastic	344,268
foamed plastic	289,802
Pipe thread protector	8,033
Rope	88,862
Sheeting	19,750
Six-pack holders	34,492
Strapping bands	22,512
Straws	191,401
Syringes	8,280
Toys	21,770
Vegetable sacks	7,336
Write protection rights	9,148
Other	149,106
TOTAL =	

GLASS	
Bottles	235,224
Fluorescent light tubes	4,561
Light bulbs	11,766
Pieces	219,468
Other	24,064
TOTAL =	

Rubber	
Balloons	36,164
Gloves	11,238
Tires	8,069
Other	43,408
TOTAL =	

Metal	
Bottle caps	106,626
Cans	237,287
Crab/fish traps	3,795
55 gallon drums	4,587
Pieces	41,204
Beverage can pull tabs	48,670
Wire	17,535
Other	44,359
TOTAL =	

Paper	
Bags	38,427
Cardboard	33,450
Cartons	24,727
Cups	46,746
Newspapers	26,393
Pieces	225,297
Plates	21,235
Other	56,436
TOTAL =	

Wood	
Crab/lobster traps	7,254
Crates	2,811
Lumber	76,830
Pallets	4,293
Other	31,196
TOTAL =	

Cloth	
Clothing pieces	53,405
TOTAL =	

* Data were taken from *Cleaning North America's Beaches: 1991 Beach Cleanup Results*, Center for Marine Conservation, 1992.

Trash Traits*

Objective
To learn about certain characteristics of marine debris and how these characteristics affect where marine debris is found in the environment.

Activity
Students perform experiments to examine whether or not trash can float, blow around, or wash away. The effects of these characteristics on the presence of marine debris in the environment are then discussed.

Subjects:	Language arts, science
Vocabulary:	Buoyant
Learning Skills:	Analyzing, classifying, collecting data, comparing and contrasting, experimenting, hypothesizing, observing
Duration:	40 minutes

Materials
- Handout, Trash Traits Results, page 256
- Handout, Trash Stats, page 257
- Several pieces of plastic, glass, rubber, metal, paper, wood, and food trash.
- A bucket filled with water, a fan, a large, shallow container (such as a large dishpan), and a watering can.

Instructors' Notes
Use the Trash Stats handout to familiarize students with current waste management issues. You may wish to modify it to better reflect the reality in your area. Either in class or as a homework assignment, ask students to use trash items to create a marine debris sculpture. Display the sculptures in the classroom or school library.

Procedure
1. Pass out the Trash Traits Results handouts. With the students, put the different types of trash (plastic, glass, rubber, metal, paper, wood, and food) into separate piles.

    - Have the students name the pieces of trash.

* From EPA, Turning the Tide on Trash, EPA 842-B-92-003, Fall 1992, pp. 8-9, 12-13, and 15-16.

- Write the names on the board and have the students fill in the *Item* and *Type* columns of their handouts.

2. Fill the bucket with water. Place each trash item in the water and ask the students the following questions:

   - Which items float? Which do not? (Make a list on the chalkboard and have the students fill in the "Does It Float?" column on their handouts.)

   - What will happen to buoyant items when they get into the ocean? What could some of the problems be with buoyant marine debris?

   - What will happen to items that don't float when they get into the ocean? Is there a tendency for all of the articles of the same type (plastic, paper, metal, etc.) to float or sink?

3. Set up the fan at one end of a table. Place each trash item in front of the fan, one at a time, to see if it is blown around. Ask the students these questions:

   - Which items are easily blown around? (Make a list on the chalkboard and have the students fill in the "Can It Be Blown Around on Land?" column on their handouts.)

   - What blows trash around in the environment?

   - Is there a tendency for all of the articles of the same type (plastic, paper, metal, etc.) to be blown around in a similar way?

4. Fill the large, shallow container with water and place it in front of the a fan. One at a time, put each article of trash in the container and turn on the fan. Ask the students:

   - Which items are easily blown around in the water? (Make a list on the chalkboard, and have the students fill in the "Can It Be Blown Around in the Water?" column on their handouts.)

   - Is there a tendency for all of the articles of the same type (plastic, paper, metal, etc.) to be blown around in the same way?

1. Fill the sprinkling can with water. Take the sprinkling can and the trash pieces outdoors, and find a slightly sloped, smooth area (a paved surface on a slight hill works well). Place the trash pieces on the sloped area, and sprinkle water on them one at a time. (Note: This part of the experiment also can be conducted in the classroom by elevating one end of a board and placing the lower end in a sink. Place the trash pieces on the elevated end of the board, and sprinkle water down the board.) Ask the students:

- Which items are easily moved by the sprinkled water? (When you get back inside make a list on the chalkboard and have the students fill in the "Can Sprinkled Water Move It?" column on their handouts.)

- What element in nature acts like the sprinkled water?

- Is there a tendency for all of the articles of the same type (plastic, paper, metal, etc.) to be affected by the sprinkled water in the same way?

Discuss how the characteristics examined (whether an item floats, is blown around, or is carried by sprinkled water) affects whether an item is likely to become marine debris.

Also discuss how the natural environmental forces of running water, wind, and rain can cause trash to become marine debris.

Other Directions

Try one of the following projects:

1. Compare the types and amounts of trash found on rural versus urban beaches
2. Compare types and amounts of trash found in different locations on a beach
3. Compare types and amounts of trash found on a rocky beach compared to a sandy beach

For each project, speculate on why differences were observed.

Another approach would be to compare the types and amounts of trash found on an ocean beach versus the shoreline of a lake, pond, river, or stream in order to compare the impact of debris on marine and freshwater environments. See the form on the following page.

Trash Traits Results

ITEM	TYPE (plastic, paper, metal, etc.)	DOES IT FLOAT?	CAN IT BE BLOWN AROUND ON LAND?	CAN IT BE BLOWN AROUND IN THE WATER ?	CAN SPRINKLED WATER MOVE IT?

handout

Trash Stats

Americans are generating more and more trash every year. In 1990, each person in the United States produced over 4 pounds of trash each day! See if you can work out these trash math problems to learn even more.

1. In 1960, Americans recycled about 5,900,000 tons of trash. In 1990, approximately 33,320,000 tons were recycled. By how many tons did recycling increase from 1960 to 1990?

2. If there are four people in a family, and each person throws away five soda cans a day, how many soda cans does the whole family throw away in a week?

3. Of the 196,000,000 tons of trash generated in the United States in 1990, about 16,000,000 tons were plastic. What fraction of the total trash generated was plastic? Reduce this fraction.

4. Americans produced 73,000,000 tons of paper waste in 1990. In that same year, Americans produced a total of 196,000,000 tones of trash. What percentage of the total trash generated did paper make up?

5. Of the 196,000,000 tones of trash generated by Americans in 1990, about 67 percent was landfilled. How much trash, by weight, was landfilled?

A Degrading Experience*

Objective
To examine the degradation of debris and learn how degradation affects the persistence of debris in the marine environment.

Activity
Students perform an experiment to learn how different types of debris degrade and how weather and sunlight affect the rate of degradation.

Subjects:	Language arts, science
Vocabulary:	Degradable, persistent
Learning Skills:	Analyzing, classifying, collecting data, comparing and contrasting, experimenting, hypothesizing, observing

Duration
- Two 40-minute periods for discussion, set up, and clean up
- 5 minutes every day (for at least 2 months) to record weather observations
- 10 to 20 minutes every week (for at least 2 months) to record degradation observations (**Note:** The longer that the experiment is continued, the more dramatic the evidence that degradation has occurred will be.)

Resources
- Assorted pairs of trash (Note: The following pieces of trash are recommended: two six-pack rings, two plastic bags, two cardboard egg cartons, two apple cores, two soup cans, two glass bottles, and two pages of newspaper).
- Two large, shallow, containers (such as large dishpans), two pieces of netting (or screening), two pieces of rope or string, an outdoor thermometer, and newspaper

Procedure
1. Explain to students that they will be performing an experiment to learn how trash degrades in the marine environment. Discuss the concept of degradation with students, and explain that some important signs of degradation are changes in shape, color, and size of an item. (**Note:** The loss of an item's ability to withstand being pulled apart also is an important sign of degradation, but this only should be evaluated at the end of the experiment so that the natural degradation process is not accelerated.)

* Source: EPA, Turning the Tide on Trash, EPA 842-B-92-003, Fall 1992, pp. 8-9, 12-13, and 15-16.

2. Next, set up the experiment:

   - Fill the containers half way with water.
   - Put one of the pieces from every trash pair in each container.
   - Cover one container with netting or screening, and secure the covering with the rope or string.
   - Take the covered container outdoors, and place it in an area that receives sun for as much of the day as possible.
   - Keep the other container inside the classroom, in an undisturbed area. (**Note:** You may want to put signs near the containers that say, ***Science experiment—Do not touch!)***

3. Every day, have a different student record the weather conditions:

   - The outdoor temperature;
   - The type of cloud cover there is (to determine how much sunlight the experiment is receiving); and
   - Whether or not there has been any rain or other precipitation.

4. Every week (for a minimum of 2 months) have the class observe the changes in the trash items, both in the indoor and the outdoor containers. Have different students note the degrees of degradation of each sample on a weekly basis. (**Note:** You may want to use a camera to take pictures of the degrading trash on a weekly basis to monitor and display changes as accurately as possible. When taking pictures, place a card with the date on it in the upper right hand corner of the photograph to keep a precise record of when the photograph was taken.)

5. At the end of the experiment spread newspaper over a large table:

   - Divide the table into two sections and label one side *indoor* and the other *outdoor*.
   - Retrieve both containers and place them on the appropriate sides of the table.
   - Take each pair of trash pieces out of the containers one at a time and compare the visible differences between the *indoor* and *outdoor* pieces of trash.

- Have a student try to pull apart the pieces of trash to determine if there is a difference in strength between the *indoor* and *outdoor* pieces. Ask the students the following questions:

- Which pieces of trash have degraded?

- Does whether the piece of trash was indoors or outdoors affect how much it has degraded? How?

- Which types of trash are degradable? Which types are persistent?

- Does the ability of an item to degrade affect whether it is found in the marine environment? Based on this experiment, hypothesize how degradability affects marine debris.

6. Compare the completed *Weather Watch* and *Degradation Data* tables. Ask the class the following questions:

   - Did the weather seem to affect the rate of degradation? How?

   - What weather conditions increase degradation rates?

Other Directions

Six-pack rings are now made of photodegradable plastic (plastic that degrades when exposed to sunlight). Conduct an experiment to observe photodegradation. (**Note:** This experiment should be conducted over at least a 3-month period.)

- Place 12 six-pack rings in an area of the classroom that will not be disturbed.

- Fasten the same number of six-pack rings outside in an area that is usually in the sun and will not be disturbed.

- Every week take a six-pack ring from both locations and compare how they look and how much they stretch when pulled.

- Discuss the differences.

If your school is near the coast or a body of freshwater, conduct an experiment to see if trash degrades faster in water or on land.

- Place several trash items in a plastic net.

- Take these netted items to a pier, marina, or other site where the net can be tied onto a fixed object so that it hangs in the water. Make sure the trash cannot escape and that the net is tied securely so that you are not generating marine debris! (**Note:** If the site is privately owned, be sure to check with its owner before proceeding.)

- Place identical pieces of trash in a plastic net and tie it to a post on land. Again, make sure the trash is securely fastened.

- Periodically compare the rates of degradation.

Instructors' Note

Other recommended sessions may be found in the EPA's, Let's Reduce and Recycle: Curriculum for Solid Waste Awareness, EPA/530-SW-90-005, August 1990. These sessions are U.S.-based but can be easily adapted for use in other countries.

Environmental Pollution: Littering*

This model lesson plan may be adapted for grades 6-12. If presented in full detail, the lesson may require 1-2 weeks.

Objectives by Skill Areas

Language, Listening/Speaking
Recite/listen to a dialogue with meaningful content. Discuss environmental issues as a whole class and in small groups. Conduct interviews and report orally.

Content
Recognize environmental problems. Identify litter and patterns of littering. Identify human influences on the environment.

Thinking
Analyze problems. Generate solutions. Infer reasons for human actions.

Language Structuring
Question formation.

Reading/Writing
Design a questionnaire. Complete a list or chart. Write in a journal.

Key Vocabulary

Litter, garbage, dump, mess, environment, trash, cause, solution, solid waste, pollution, survey

Materials

- Teacher-generated dialogue
- Poster
- Items of trash (empty soda cans, paper wrappers, broken glass, etc.)

Instructors' Notes

Two weeks before introducing this topic, hang a scenic poster on the wall. This piques the students' curiosity and visually represents some background information about the topic. Some students may comment on the lovely view or ask vocabulary questions about objects in the scene. Every other day, attach an item that might be considered trash (candy wrappers, an empty box, an aluminum can) to the poster, thus creating a *trash collage*. The students may be curious but do not reveal the purpose.

Pedagogical notes appear in *italics* throughout the procedure before the activity they refer to.

* Taken from How to Integrate Language and Content Instruction, by Deborah J. Short, pp. 42-46.

271

Procedure

All students can participate. Teacher helps them make speech-print connections by writing their comments on the board.

1. Refer to the *trash collage* and ask students what they think it represents.
   - Write student ideas on the board.
   - Through guided questioning, lead the students to recognize that the lovely place is being ruined by litter.

2. Changing the focus, turn from the poster scene to the local environment, and add some additional vocabulary to the list.
   - Ask some of the more advanced students to explain why places become ruined by littering.
   - Write comments on the board.
   - Some students may venture consequences of the littering problem.

The following dialogue introduces some key vocabulary and causes associated with littering in an interactive way.

3. Ask two of the more advanced students to volunteer to come to the front of the class, and role play the following dialogue:

Littering At School

Student 1: Don't throw that on the ground.
Student 2: Why not? What's the big deal?

Student 1: Our school looks like a garbage dump.
Student 2: So what? Tell one of the younger kids to clean it up.

Student 1: But you littered.
Student 2: Everyone does it. Teachers do it too.

Student 1: You're impossible. Do you know what our school will look like if everyone continues to litter?

Having begun with concrete examples (poster, dialogue), students can now expand and organize their information.

4. Make a chart on the board with these headings: **PROBLEMS, CAUSES, SOLUTIONS**.

- Categorize and expand the vocabulary list with student input.
- Show students a written form of the dialogue.

The following activity incorporates some language practice for the students.

5. In order to check on comprehension and practice writing questions, have the students take dictation. Dictate the following questions:

   Where are they?

   Who is talking?

   What happened?

   Why is one student upset?

   Does this happen at our school?

The following paired activity allows for oral language practice in the context of the lesson topic.

6. Have pairs compare their work and ask volunteers to write their dictation on the board.
   - Encourage students to peer edit.
   - Discuss relevant grammar points (e.g., question words, verb-noun positions).

7. Ask students to think of additional questions about the dialogue.
   - Write the student-dictated questions on the board.
   - Work as a class to edit errors.
   - Add questions, such as, "*Why is there a problem?*" (cause) or, "*What can you do?*" (solution).

8. Practice:
   - Have pairs role play the dialogue, *Littering At School.*
   - Discuss the vocabulary and issues together.
   - Have pairs ask each other the class-generated questions (more advanced students should answer first).

The following review activity leads students to work individually at first, then with peers.

9. Review: After the structured conversation, ask students to write 10 questions and answers about littering. Before they hand them in, encourage students to peer edit.

This task applies the topic directly to their lives.

10. For homework, have students write in their journals about the trash they see as they go from school for several days.

    As this task continues, expand the vocabulary list under *PROBLEMS* and put it on a poster or chart to hang in the room.

    Make two other posters, one with *CAUSES* and the other with *SOLUTIONS* as well.

Small groups offers all students a chance to participate.

11. Application:
    - In small groups, have students discuss the causes of littering, then share ideas with the class.
    - Write the ideas on the *CAUSES* poster. Then ask groups to consider the solutions.
    - Share students' suggestions and write on the *SOLUTIONS* poster.

This activity reinforces the language structure objective.

12. Next, have small groups design a questionnaire to interview classmates, teachers, neighbors, family, and friends. The questionnaire should be limited to five questions. If needed, help groups plan their questions but do not provide them with a full list. Possibilities include:

    Does litter bother you?

    What do you throw away as litter?

    Why do people litter?

    What can be done about this problem?

    Do you litter?

    Who is responsible for solving this problem?

13. Home task: Have students conduct a survey for three days, each interviewing 10 people. (If they interview non-English speakers, they may ask questions in the native language, but should write responses in English.)

Task 14 encourages interaction with non-classmates on the topic and may provide clarification practice as students explain their task to others.

Each group contributes to the whole class. Optional presentations allow each group to choose the one best suited to their learning styles and academic skills.

14. Follow-up and Extension:
    - Have students share this information in their groups.
    - Have recorders in the group organize the results of the survey and a representative of the group report to the whole class.
    - Help the whole class find ways of organizing and presenting the results of the survey. Ideas include:
        - List the results on posters
        - Chart and quantify responses
        - Prepare an oral report
        - Stage a debate between individuals who litter and those who don't
        - Create a role play or drama
        - Design a visual display or collage, highlighting *before* and *after* scenes.

15. Have students write a composition. Display the papers and if appropriate, encourage some students to submit their work for publication in a school newspaper.

These projects further students' problem-solving and study skill development.

16. Long-term Projects:
    - Expand this introduction to individual generation of and influence on solid waste pollution to heighten students' awareness of other sources of solid waste (industrial, agricultural, municipal) and methods of disposal.
    - Design additional lessons to help students research sources of solid waste in their communities and learn about local disposal methods, such as dumping, burying, burning, recycling, etc.
    - Students may want to form action groups to decrease solid waste pollution in their towns.

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